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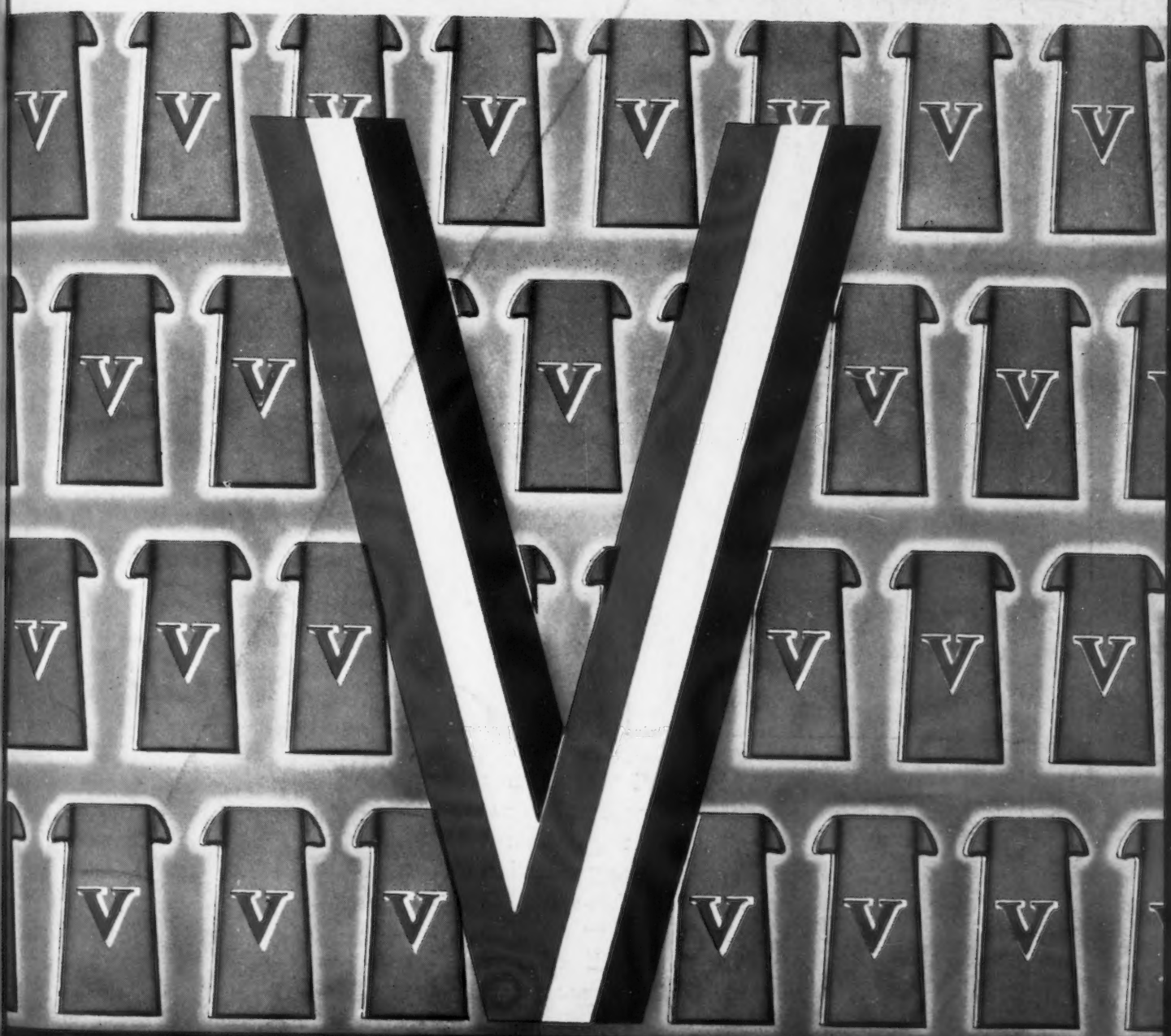


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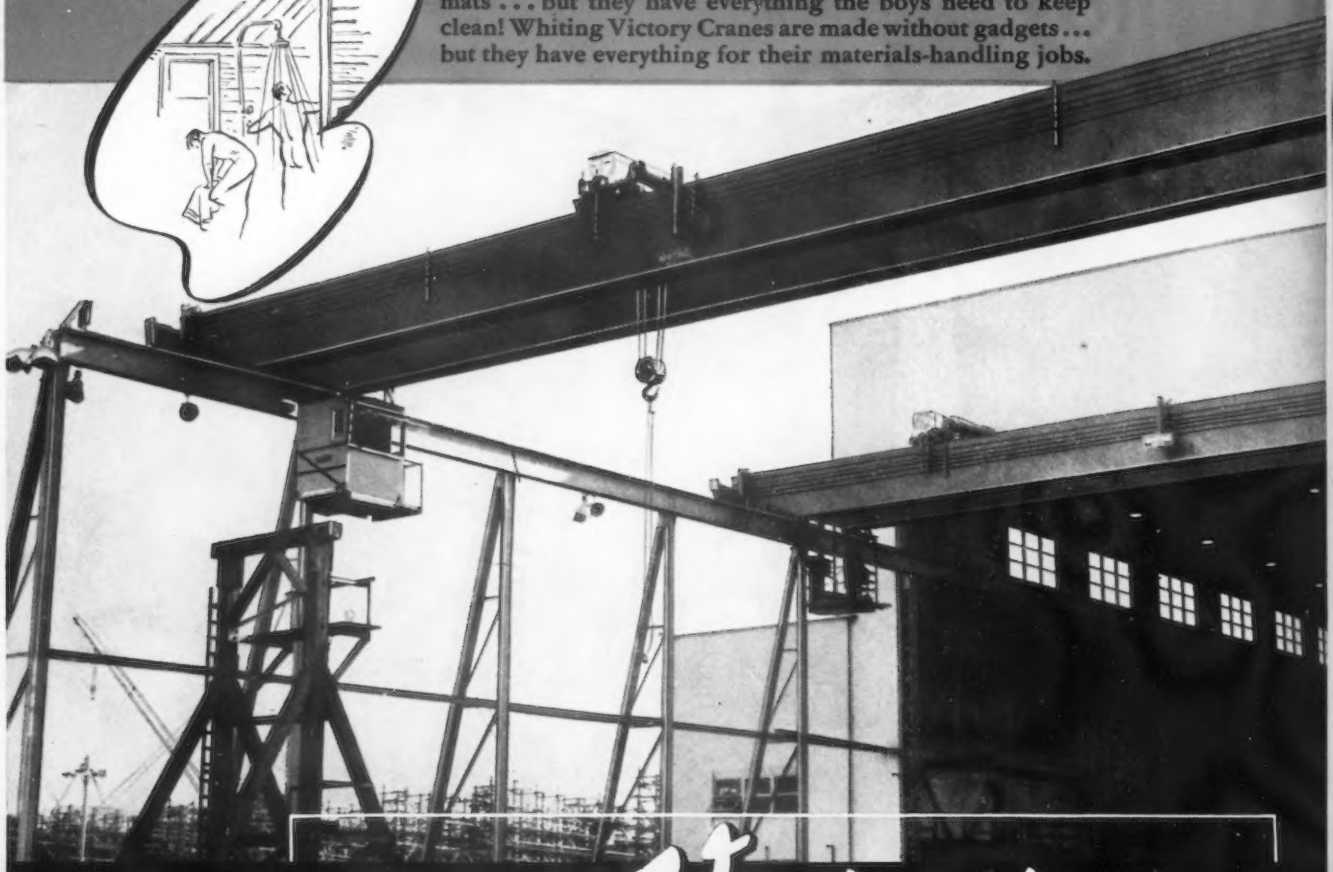

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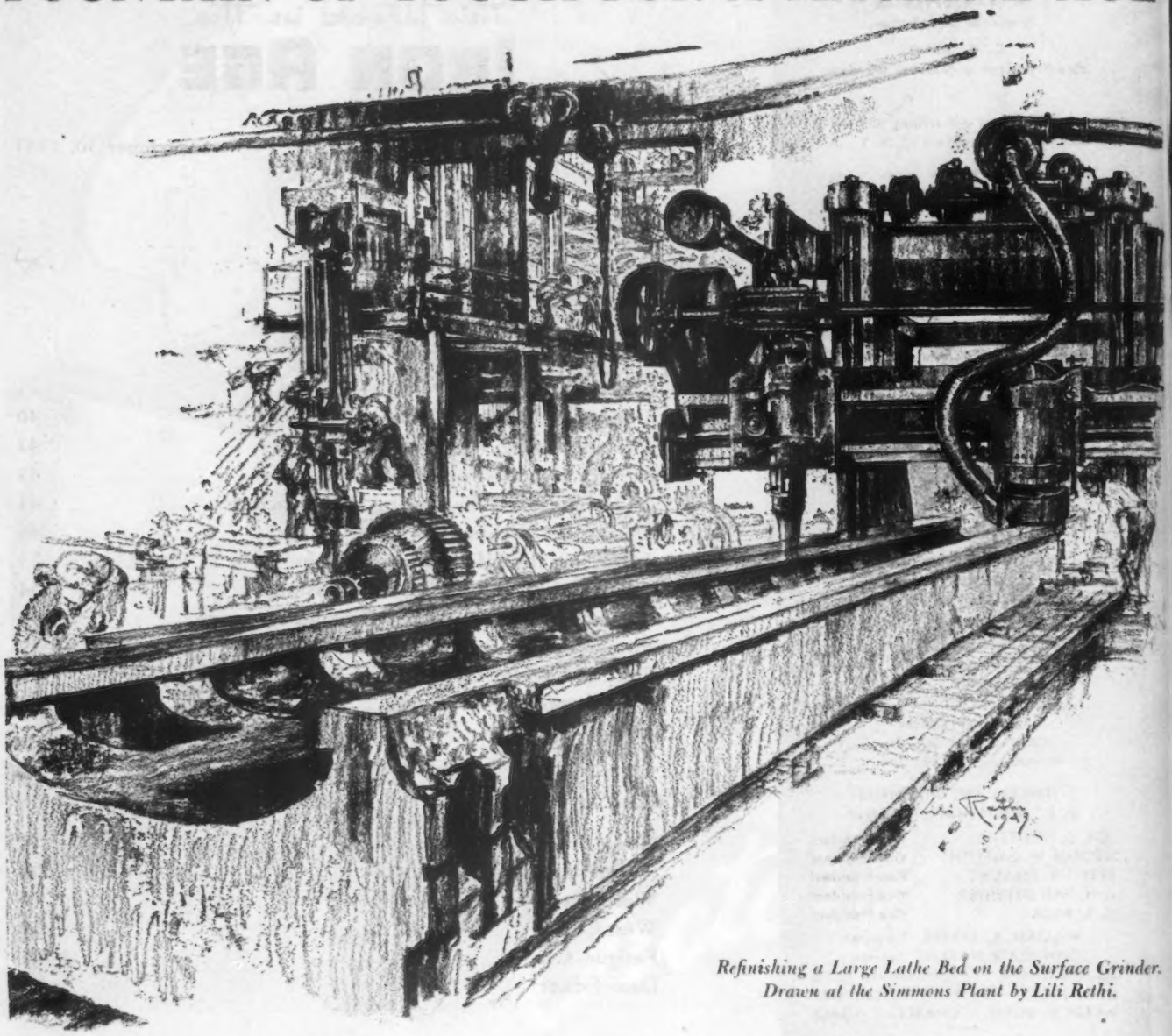
# FOUNTAIN OF YOUTH FOR A MACHINE AGE



*Refinishing a Large Lathe Bed on the Surface Grinder. Drawn at the Simmons Plant by Lili Rethi.*

PONCE DE LEON came to the New World seeking a Fountain of Youth for the human race. He never found it. Medical science may yet.

In this same New World the machine has been developed to its maximum achievement. Mass production of commodities with the highest standards of precision is the American hallmark. The world's largest users of the products made from machine tools, the American people as a whole only now realize what they are, their significance in a world at war, and the peculiar difficulties involved in their manufacture; namely, that while machine tools make mass production possible, they cannot, in turn, be mass-produced. They are our master tools.

Machine tools, too, have a span of life, but for them engineers have created a unique Fountain of Youth... the Simmons plant for Engineered Rebuilding. Here machine tools of all types, sizes and ages throw off their years, return to work rejuvenated. The treatment: dismantling to the bare casting, all surfaces refinished by either grinding, planing or hand-scraping; all worn parts, such as gears, bushings and shafts, replaced with new; the machine then re-assembled along the same lines as followed by the original manufacturer and tested under power.

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*1721 North Broadway, Albany 1, N. Y.*

SIMMONS *Engineered* REBUILDING

The
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ESTABLISHED 1855

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# A Double Barreled Problem

SALEABILITY, during the coming post-war years is going to be largely determined by the cost and price of products to the ultimate consumer. To move 50 per cent more goods than we did in our pre-war markets, and thus to finance consumption and employment without going deeper and deeper into the hole of national debt, will require drastic cost and price reduction of consumer goods.

In the case of people such as yourselves, who are in the metal working industry and hence several steps removed from the ultimate consumer, it will mean turning out superior machines, materials and equipment capable of reducing the manufacturing costs of those who buy your products. This of course is a problem primarily for your research, engineering and design departments.

Your merchandising problem, in connection with need for overall cost reduction will be equally acute. The cost of distribution, which is a large percentage of final cost to the consumer must be drastically reduced. Distribution is now a large portion of total cost and its ratio has increased with the progressive decrease in direct production costs.

In the old days, before the factory system developed, it cost a good deal more to *make* a pair of shoes, a hunter's rifle or a farm wagon than it did to sell them—probably three times as much at a guess. Today the final consumer frequently pays three or four times the actual factory cost of the article that he buys. This does not mean that price has increased, for it has not; and in fact the consumer's dollar today will go probably ten times farther in buying manufactured products than it would in handicraft days. It is the ratio which has changed—the ratio between the manufacturing and the distribution elements of cost.

For years, when one spoke of "cost reduction", he thought of production costs. Experts and efficiency engineers have gone through our factories with fine tooth combs, improving processes and methods until the cost of making things has been brought to astonishingly low levels. Now the same process must be applied to merchandising and distribution.

This is a problem which must be taken up by top management. Government cannot solve it. It has demonstrated that fact very clearly in those industries such as coal and transportation, in which Government regulation has attempted to supplant the competitive situation by regulation. In practically all such instances, consumer costs have progressively risen.

Private industry reduced production costs in our factories by developing mass production. It accomplished this not by reducing but by increasing the investment in mechanization, and by making comprehensive and extremely detailed studies to reveal waste time, effort and motion.

Undoubtedly distribution would profit similarly in cost reduction if we gave it similar attention.

J. H. Van Deventer

*Jimmy is anxious to see his Dad—his Mother is working for Victory.*

*Jimmy's Mother is now head of the crane hookers in one of the Inland departments.*

# Jimmy's Dad Fights, His Mother Works, *To Help Bring Victory*

Little Jimmy's Dad, Sgt. James C. Maloney, is doing his bit in an Air Force fighter squadron to win this war. Jimmy's mother is doing her bit, too, as head of the crane hookers in an Inland Steel Co. department.

Sergeant Maloney left Inland to enlist in September, 1940. Jimmy was only about five months old when his Mother, also a former Inland employe, returned to work. She wanted to do her part, along with Sergeant Maloney, to hasten the day when peace will return and Jimmy will see his Dad for the first time.

This little family story is typical of the American spirit for Victory—a spirit which moves men and women to do all in their power to help supply fighting equipment needed by America's fighting men to crush the enemies of Democracy.

Do you know a man, or woman, not now in war work—some person who can take a place in industry left vacant by a fighter? If so, urge him or her to join the ranks of war workers and hasten the day when Jimmy's Dad and all the other victorious Yanks will come marching home.

ARMY E NAVY

## INLAND STEEL COMPANY

38 S. Dearborn St. — 50th ANNIVERSARY — Chicago 3, Illinois

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The IRON AGE
SEPT. 30, 1943

# NEWS FRONT

• Private Congressional canvasses show that if the Burke-Wadsworth universal conscription bill were to come to a vote now, it would likely pass the House by 75 votes. Meanwhile, in the works is a general, national job freeze and labor priority directive, considered by its authors as an alternative, by many others as a preliminary to conscription.

• Inter-agency disputes over contract termination have reached the point where termination control may be vested entirely in a new procurement agency created through the Office of War Mobilization. Dismissal wages for workers, analogous to post-war reserves for industry, is one major termination policy not showing signs of becoming a tangle.

• Use of hardenability characteristics instead of chemical analyses for specifications is a coming commercial development in steel. Several mills are experimenting with adjustment of ladle additions to hit hardenability limits instead of analyses specifications, and one large warehouse is supplying customers with Jominy tests results on each lot of alloy steel.

• Phosphate coatings, brittle under ordinary test conditions, have recently been shown capable of developing the ductility and deformability necessary for a parting layer separating the tool and the work during deep drawing.

• Army officials several times in six months have threatened the Axis with the mighty punch of America's new super-bombers, particularly the B-29, only a little larger than the Fortress despite much rumor to the contrary. The prototype B-29 now flying around is one tough looking baby, but production prospects indicate that it will be many a month before there are operational squadrons.

• Meanwhile: Experimental bombers much larger than the B-29, genuine air battleships, will likely never have much role in this war.

• Equipment orders are being filled here for four Russian blast furnaces, with Lend-Lease taking care of the financial arrangements.

• Brass cartridge cases, in the larger sizes, are still the preference of the Army, despite the remarkably low failure record of steel cases. However, Britain, which has rigidly adhered to brass cases, has just placed heavy steel case orders in this country, mostly in the 76 and 90 mm. sizes.

• No period in history has witnessed as many genuine new instruments of warfare as has the past several years. Radar is one; a new anti-submarine technique is another; and still another very hush-hush development is reaching completion that in itself could well win the war.

• And two more about which very much more will be heard are radio-directed bombs, and rocket equipment for aircraft and for bombs and shells. The Germans have long kicked overloaded bombers off small fields with supplementary rocket equipment attached to the wings, and the Italians for over a year have had an airplane of military size powered by rocket energy.

• Radio-directed bombs were yanked from under the censorship blanket by Churchill's disclosure a week ago that the Germans are using them with considerable effect. The development has roughly followed this pattern:

First: Russia's Stormovik airplane for several years has carried rocket bombs slung on wing rails, aiming being done by aiming the airplane and the rocket energy employed solely to give added penetration to knock out tanks.

Second: A year ago the U.S. came out with a much smaller variation, the Bazooka, an infantry weapon for stopping tanks. About the same time the Germans experimented unsuccessfully with very heavy rocket bombs on the Stormovik pattern against naval craft in the Mediterranean theatre.

Third: The next logical step was to increase range and accuracy of rocket bombs by radio actuation of vanes on the bombs. The Germans are already doing this with quite heavy bombs, dropped in groups some 10 miles away and 5 miles up from the objective. The whole operation is pretty tricky, but so promising that it will receive a great deal of attention over the next year.

# Control of Flange Wrinkles

## In Hydro-Press Forming

THE combination of a rubber punch and a form block used in the hydro-press is an excellent method for forming sheet metal parts. However, certain problems arise when this method is used that require special attention on the part of the designer in order to produce a satisfactory finished part. The most serious problem is that of forming a flange about a convex radius.

When a flange is formed about a convex radius, the metal is compressed since the outer edges of the blank are forced into a smaller diameter. The extent of the compression is determined by the width of the flange, the angle of bend, and the convex radius. Due to the inability of the rubber punch to force the metal to flow in compression and hence thicken, buckles will form in the flange and must be made smooth by a hand operation unless some form of relief is provided. Two widely used methods for flange relief are notching and scalloping the edges of the blank. Both of these methods require extra time and care in material preparation and should therefore not be considered.

Flange wrinkles always bend away from the forming die due to the fact that the forming dies does not allow the metal to bend inward. Therefore, it seemed logical to presume that a forming block designed to allow the flange to buckle inward would produce a smooth faying surface except where the inward wrinkle occurs. The successful forming of inward flange wrinkles on hydro-press operations during production runs will eliminate approximately 50 per cent of the time required to produce the average part that leaves the hydro-press at the present with uncontrolled outward wrinkles.

The Dallas Division of North American Aviation, Inc. eliminated the necessity for hand work after

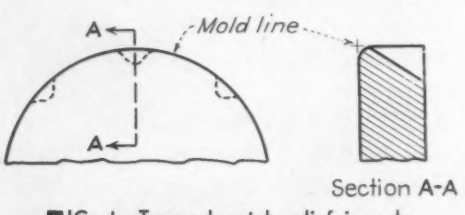


FIG. 1—Tapered notch relief in a hydro-press form block.

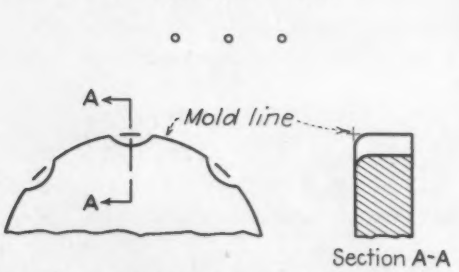


FIG. 3—In this type of flange relief, the cutouts are within the normal mold line of the form block.

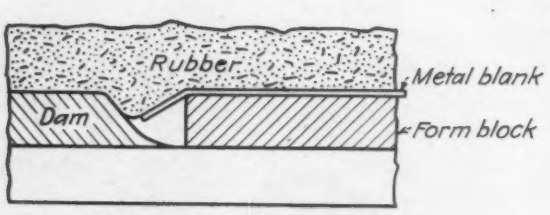


FIG. 4—Use of a Masonite dam around the form block helps to direct the rubber pressure against the flange being formed.

FIG. 2—Use of tapered notches in the form blank work well enough on form blocks having a radius of 10 in. or over, but do not prevent outward buckles when the convex radius is as small as 4 in., as these photographs prove.

***. . . In hydro-press forming of flanges on aircraft parts having a convex radius, buckles or wrinkles generally occur that ordinarily must be removed by a hand operation. This report summarizes the results of experiments made to overcome this handicap by relieving the form block so as to produce inward buckles and leave a smooth faying surface suitable for riveting.***

o o o

By WILLIAM H. SNOW
*Engineer, North American Aviation, Inc.*
*Inglewood, Cal.*

o o o

forming fuselage frames on the hydro-press by cutting a tapered notch in the form block allowing the metal to buckle inward where the notches occurred. This provides a smooth faying surface between the inward wrinkles, but this method worked successfully only for convex radii of 10 in. or over. The value of this type of flange relief, however, was realized by the Inglewood Division and experiments were made to determine a method for relieving flanges formed on the hydro-press around a smaller radius.

Experiments were initiated using masonite form blocks having a 4-in. convex radius. The 4-in. radius was judged to be a practical minimum radius for experimental purposes as previous experience indicated that radii between 4 and 10 in. produced the more serious flange wrinkles. A standard ¾ in. flange depth was used in order to reproduce prevailing design practice at North American Aviation, Inc.

The first experiment was made with a form block having tapered cutouts at 2 in. on centers, Fig. 1. The material used was 0.032 in. 24SO Alclad. Results were very unsatisfactory, as shown in Fig. 2. There were indications that the inward wrinkle started in only four places. Additional cutouts were added to give a spacing of 1 in. on centers. The additional cutout produced a slightly better condition but the resulting part still contained outward buckles.

## Use of a Dam

Cutouts in the form block were revised by removing the taper in the cutout and running the radius of the notch inside of the normal mold line as shown in Fig. 3.

Parts produced on this revised block were not entirely satisfactory, but the metal had started to buckle at the cutout locations which was an indication of satisfactory progress. From observation of the metal part, it was apparent that the rubber was creeping under the edge of the flange, and preventing a smooth surface from being formed between cutouts. Closer control of the space between the edge of the flange and the form block was accomplished by building a dam, Fig. 4, to restrain the rubber and confine it to a definite area where an even pressure would be exerted about the radius of curvature as well as preventing the rubber from creeping under the edge of the metal blank during the forming operation.

Using a form block of 4-in. convex radius in conjunction with the dam and a flange ¾ in. deep, the faying surfaces between the buckles were smooth enough to be accepted by the inspection department, since the slight waviness left in the flange edges would be removed by the rivet

ABOVE

**FIG. 6 — Uniform inward flange buckles are assured with Cerrobend wedges used in conjunction with a Masonite dam.**

o o o

RIGHT

**FIG. 7 — The outward buckles in this fuel tank frame will have to be removed by hammering and shrinking.**

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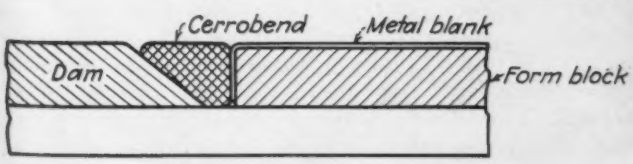
**FIG. 5—Cerrobend wedges in conjunction with a Masonite dam give full control of flange wrinkles. (See also Fig. 6.)**



gun during the riveting operation. Two hits by the hydro-press removed most of the remaining small waves in the edge of the flange. The material worked was 0.040 in. 24S0 alclad.

The use of wedges made of Cerrobend metal (a modified Woods metal that liquifies at 160 deg. F.) was even more successful and produced perfect parts. To make the wedges, Fig. 5, a metal blank was formed by hand over the forming block and Cerrobend metal poured into the space between the part and the dam. After the metal had solidified, it was removed from the forming die and cut into three separate slugs to provide for self adjustment during the forming operation.

A blank was put on the forming block and hit once with the hydropress rubber punch, then the Cerrobend slugs were put in place and the part hit once more with the rubber punch. A perfect part was produced. This operation was repeated several times and in each case a part was produced that required no subsequent hand forming. Fig. 6 shows one of the slugs in place and the quality of the wrinkles formed.

In forming 0.040 in. 24S0 around a 10 in. convex radius, the addition of a dam to confine the rubber was all that was required to form a perfect part with one stroke by the hydropress.

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FIG. 8 — The same part as shown in Fig. 7, but formed on a block provided with flange relief cutouts. All the wrinkles are inward.

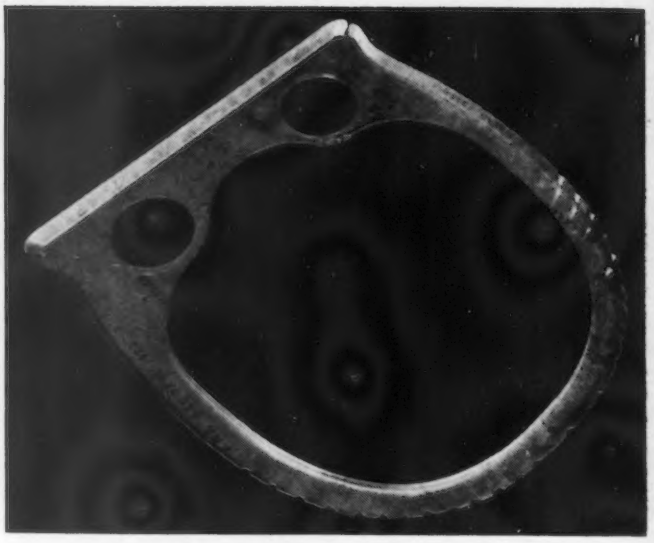

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Fig. 7 is a photograph of a fuel tank frame showing the outwardly wrinkled condition of the flange when formed over a die having no provision for flange relief. The wrinkles are subsequently removed by a hand operation and then put on the shrinker to bring the angle of bend back to the approximate correct angle. Fig. 8 shows the same tank frame formed over a die having flange relief cutouts and a dam to confine the rubber.

The results of these first experiments indicate that a further investigation from a more technical viewpoint is warranted, as the relieving of compression in the flanges by allowing the metal to buckle inward is entirely practical from a production standpoint.

# Desulphurizing with Acid Slags

SOME recent supplementary work on the desulphurization of pig iron with acid blast furnace slags, described by W. Oelsen and H. Maetz in the *Archiv für das Eisenhüttenwesen*, indicates that the strong desulphurizating action of acid slags at high temperatures (1700 deg. C., 3092 deg. F.) is due only in small part to the silicon suphide liberated as a gas. The initially acid slags only begin to exercise a powerful desulphurizing action on the pig iron when the latter has picked up very high and technically unsupportable amounts of Si, *i.e.*, over 4 per cent, so that the final slags are very strongly basic. The bulk of the sulphur, actually more than 70 per cent of the total present, is retained in this highly basic final slag after the pig iron is desulphurized. Lengthening the time of reaction causes an increase in pig Si, thus raising the degree of basicity of the slag and giving a very low S value for the pig iron.

The proportion of S removed by volatilization, which may amount to 30 per cent of the total S present, is very small compared to that taken up by the final slag, which can reduce the S from 0.6 to 0.01 per cent. Changes in the amount of slag present are strongly reflected in the S content of the pig iron when using an acid slag, desulphurization being much less, as less slag is present; but Si reduction raises the basicity of the slag much more with a small amount of slag than with a large amount, so that the gross effect may be masked.

Additions of Ti oxide to the acid slags have less effect at the high temperatures in question than fluxes, but cause a marked increase in the amount of Si in the iron, which must be reduced, and a correspondingly greater increase in the basicity of the slag; this necessarily results in improved desulphurization of the pig iron. At the high temperatures ruling, only a small amount of the Ti oxide added remains in the slag, also only a little of the Ti passes into the iron, the bulk being probably deposited as Ti carbide on the walls of the graphite crucible. From these experimental results the authors deduce the general condition governing the desulphurization of pig iron with blast furnace slags, particularly the effect of the basicity of the slag, the Si content of the pig iron, and the amount of slag. A comparison of the results of laboratory experiments with actual desulphurization in the blast furnace indicates that there is numerical correspondence between the two reactions and the governing conditions.

# Surface Hardness of Metals...

***... A highly useful new method for measuring the hardness of thin surface layers of metals, involving reduction of optical reflectivity after sand impact, is described herein in detail.. In addition, hardness values, as determined by the new method, are given for a number of platings and protective surface preparations.***

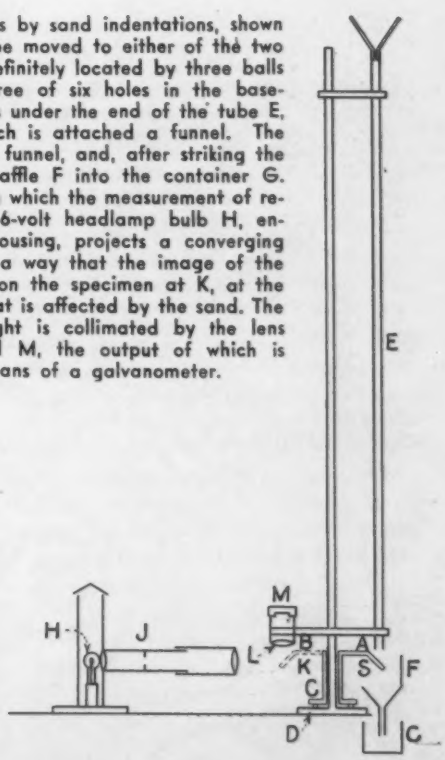
ATTEMPTS to measure the hardness of thin layers, particularly of brittle materials, have met with little success, owing largely to the fact that a very small indentation is difficult to produce under standard conditions and difficult to measure accurately. Also, the properties of the underlying material may exert a profound influence on the result. The methods by which such measurements are now made are not regarded as entirely satisfactory, and for certain purposes they are completely valueless. These cases include the very hard electroplated white bronze coatings, and the surfaces of metals that have been polished, anodized, etc. The scratch hardness test has been used to some extent for this purpose, but for very hard or very thin coatings this is not at all satisfactory.

A new method for determining surface hardness, recently devised in the laboratories of the Tin Research Institute and described in its publication No. 108, by Bruce Chalmers, is based on the principle that while it is difficult to apply a very small indenting force under accurately standardized conditions, it is possible to apply a very large number of such forces so that while each is not under control, the result is statistically definite.

The procedure is to drop a large number of grains of sand, or particles of emery, from a fixed height on to the specimen. The particles are of varying shapes, and, within limits fixed by the screening of the sand, of varying size. They are, in addition, randomly orientated when they hit the surface. The impressions in the surface therefore vary widely in shape and size, but if a sufficiently large number of particles is used, the average shape and size of the pits depend only on the hardness of the material, while the number of indentations depends on the amount of sand used.

The average size of the indentations is measured by determining the reduction in the specular reflectivity of the surface. The instrument used, in its simplest form, is illustrated in Fig. 1. The variation of reflectivity with the quantity of sand used is illustrated in Fig. 2. Experiments show that the graph obtained is independent of the unit quantity of sand chosen. It is found that the reflectivity approaches a constant value as the amount of sand is increased, this value differing for different materials.

FIG. 1—Instrument for measuring hardness by sand indentations, shown diagrammatically. The specimen S can be moved to either of the two positions A and B, in each of which it is definitely located by three balls on the sole-plate C, which engage in three of six holes in the base-plate D. In the position A, the specimen is under the end of the tube E, of length about 39 in., to the top of which is attached a funnel. The required quantity of sand is placed in the funnel, and, after striking the specimen, the sand is deflected by the baffle F into the container G. The B position is that in which the measurement of reflectivity is made. A 6-volt headlamp bulb H, enclosed in a suitable housing, projects a converging beam of light in such a way that the image of the aperture J is focused on the specimen at K, at the center of the ellipse that is affected by the sand. The specularly reflected light is collimated by the lens L on to the photocell M, the output of which is measured by means of a galvanometer.



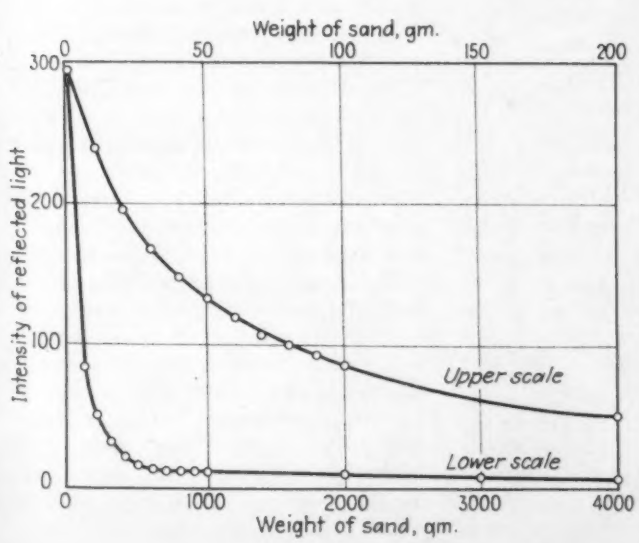




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FIG. 2—Variation of reflectivity with quantity of sand used.

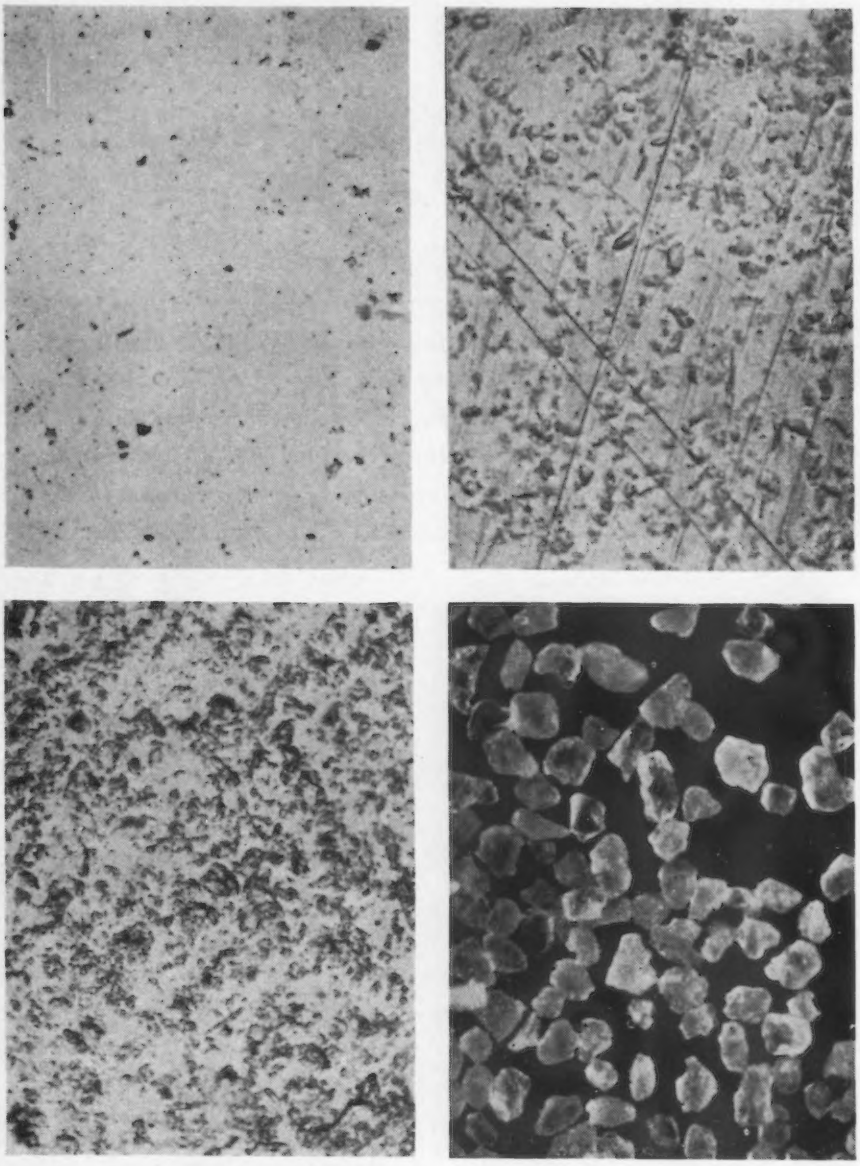

FIG. 3—Appearance of different surfaces after the same amount of sand action. At the upper left is the surface of cast speculum metal, at the upper right the surface of brass, and at the lower left the surface of tinplate. All three were subjected to action of 50 gm. of sand. Enlarged 500 diameters. At the lower right is a sample of the sand used, enlarged 20 diameters.

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TABLE I

Surface Hardness of Some Hot Dipped Tin Alloy Coatings

| Addition | Surface Hardness |
|---|---|
| None | 30 |
| 1.0 per cent bismuth | 44 |
| 5.0 per cent bismuth | 39 |
| 0.1 percent nickel | 50 |
| 0.1 per cent cobalt | 44 |
| 0.6 per cent copper | 45 |

TABLE II

Hardness Values of Silver and Nickel Surfaces Protected by Rhodium Plating Flash

| Composition | Surface Hardness |
|---|---|
| Silver | 43 |
| Silver and rhodium | 89 |
| Nickel | 300 |
| Nickel and rhodium | 165 |

TABLE III

Hardness Values of a Selection of Protective Oxide Films

| Surface | Surface Hardness |
|---|---|
| Tinplate | |
| Untreated | 30 |
| Kerr's protective film* | 36 |
| Black film, unpolished† | 240 |
| Black film, polished | 170 |
| Aluminum | |
| Anodic film | 225 |

TABLE IV

Effect of Surface Preparation on the Surface Hardness of Annealed Copper

| Method of Preparation | Surface Hardness | Ratio |
|---|---|---|
| Anodically brightened | 35 | 1.0 |
| Polished with "Silvo" | 67 | 1.9 |
| Polished with "Brasso" | 105 | 3.0 |
| Polished with mop and lime | 130 | 3.7 |

The appearance of different surfaces after the same amount of sand action is shown in Fig. 3.

Among the surface hardness measurements made by the Tin Research Institute were series on hot dipped tin alloy coatings, silver and nickel surfaces protected by a flash of rhodium plating, and certain oxide films. Values for these measurements are given in Tables I, II and III.

Table IV summarizes the effect of surface preparation on the surface hardness of annealed copper, while Tables V and VI summarize similar data for tin and nickel.

Some preliminary measurements were made to ascertain the effect of heat treatments on the hardness of the surface layer. The results so far obtained show that the increased surface hardness of tin due to polishing or burnishing is retained after annealing at 212 deg. F. for several hours, while the increase in Vickers hardness produced by rolling is removed in less than half an hour under similar conditions. Results on copper, however, have shown that most of the extra hardness due to polishing on the mop is removed by annealing. This is probably due to the production of a worked layer under the Beilby layer; the worked layer is softened by annealing while the Beilby layer is not.

Cathodic treatment in sodium carbonate solution has been found to reduce the surface hardness consid-

TABLE V

Effect of Surface Preparation on the Surface Hardness of Tin

| Method of Preparation | Surface Hardness | Ratio |
|---|---|---|
| Anodically brightened | 25 | 1.0 |
| Polished with "Silvo" | 31 | 1.25 |
| Polished with mop and rouge | 41 | 1.65 |

TABLE VI

Effect of Surface Preparation on Surface Hardness of Nickel

| Method of Preparation | | Surface Hardness |
|---|---|---|
| Bath A | as plated | 310 |
| | as finished | 600 |
| Bath B | as plated | 200 |
| | as finished | 540 |
| Bath C | as plated | 325 |
| | as finished | 800 |
| Bath D | as anodically brightened | 73 |
| | mop polish | 210 |

erably. Some results illustrating this are given in Table VII. Subsequent exposure to air causes a gradual increase in the surface hardness, which does not, however, return to the value as measured before the treatment. Storage in an atmosphere of nitrogen is found to suppress the recovery of surface hardness.

Less practical importance but greater academic interest attaches to the use of this method for studying surface phenomena, of which one example is the effect of mechanical polishing on the hardness of the surface. The effect of heat treatment on the polished layer may also be of some interest, particularly when the metal concerned is an alloy subject to age-hardening, temper-hardening, or precipitation. It is possible that the equilibrium of such alloys may differ according to whether or not they constitute a polished layer, since it appears that a polished layer is stable under conditions in which the metal in bulk, worked to the same hardness, would anneal or recrystallize. This may have some application in connection with bearing surfaces that are subjected to continued friction.

TABLE VII

Effect of Cathodic Cleaning on Surface Hardness

| Metal | | Surface Hardness | |
|---|---|---|---|
| | | Before Cathodic Treatment | After Cathodic Treatment |
| Tin | | 41.5 | 32.5 |
| Nickel 1 | as plated | 310 | 85.0 |
| Nickel 2 | as plated | 200 | ... |
| Nickel 3 | as plated | 325 | ... |
| Nickel 1 | as finished | 600 | 121 |
| Nickel 2 | as finished | 540 | 225 |
| Nickel 3 | as finished | 800 | 110 |
| White bronze: Cu 70 per cent | | 875 | 186 |
| 66 " | | 880 | 155 |
| 64 " | | 800 | 206 |
| 62 " | | 960 | 273 |
| 61 " | | 980 | 206 |
| 59.5 " | | 945 | 236 |
| 53.5 " | | 925 | 240 |
| 51 " | | 790 | 153 |
| 41 " | | 740 | 132 |
| Silver | | 76 | 54 |
| Copper | | 120 | 80 |

# Inclusions Caused by Casting Pit Refractories

FAILURE of a high percentage of forgings to meet transverse elongations requirements was thought to be due to an increase in the non-metallic inclusions of the slaggy stringer type, J. R. Rait reports in the Transactions of British Ceramic Society. Since the occurrence of this failure was coincident with the use of more siliceous refractories for uphill casting, a systematic investigation of uphill casting pit refractories as a source of non-metallic inclusions was made and the following conclusions reached.

The manganese of liquid steel reduces the free silica, particularly the quartz of the refractory, to produce MnO and silicon in order to reach equilibrium since the manganese-silicon ratio of the steel is greater than is necessary for equilibrium. The manganese oxide thus formed fluxes the refractory to form a liquid manganese alumino-silicate slag. The amount of slag formed on the more siliceous refractories is considerably greater than on the aluminous refractories, the difference in attack being attributed to the large quartz content of the former type and the very low content or absence of quartz in the latter.

The manganese alumino-silicate is washed off the runner bricks and carried into the ingots. In the case of small 11-in. ingots, freezing is sufficiently rapid to trap some of this slag.

During forming, these silicates which are plastic are formed into stringers. In the case of forgings of steel poured through the siliceous refractories there are enough stringers to lower the transverse elongation.

The composition and amounts of slag formed on a given type of refractory by different alloy steels with similar carbon, manganese and silicon contents are very similar; thus the alloying constitutents have little influence on this reaction. A steel with a higher manganese content and manganese-silicon ratio produces a slag with a higher MnO content on a given refractory. The composition of the slaggy inclusions is therefore controlled by the carbon, managnese and silicon contents of the steel and the composition of the refractories. The extent to which crystallization of these slags is completed is governed by the subsequent heat treatment of the ingots.

Another important factor in the formation of these inclusions is the constitution and properties of the refractories. The manganese attack is greatly reduced when quartz is absent, which normally requires a minimum alumina content of 38 per cent. Fireclay refractories should be fired at a minimum temperature of about 2010 deg. F. to attain the minimum free silica content. The maximum on the spalling resistance-firing temperature curve should occur at 2010 deg. F. or higher so that the maximum or adequate spalling resistance can be achieved with the minimum free silica content.

It has been found in various steel works that fireclay nozzles which have been boiled in tar have an increased resistance to wear. The most probable explanation is that the free carbon deposited in the pores of the nozzle decreases the manganese reduction of silica and the evaporation of the volatile fractions of the tar tends to maintain the nozzle at a lower temperature.

# Deep Fillet Welding

## Applied to Ship Construction


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***... In standard welding practice, little or no penetration at the root of the weld can be expected without special plate edge preparation, and the conventional practice of filling grooves and building up heavy reinforcements is wasteful of time and material. Experience with the deep fillet technique used at this yard shows that the savings in labor and material lie in the range of 35 to 50 per cent for work to which the technique is specifically applicable. At the present time this process is limited to continuous fillet welds in the flat and horizontal positions.***


IN October 1942 the welding engineering department of the California Shipbuilding Corp. embarked on a program of testing and development based on the findings of the Lincoln Electric Co., Cleveland, and reported in its bulletin No. 432, "'Fleet-Fillet' Welding Technique for Speeding War Production," September 1942.* To avoid the use of trade names and to cover minor variations in the procedure, the California Shipbuilding Corp. refers to this technique as "Deep Fillet," a name derived from the unusual penetration obtained.

**See also "Faster Arc Welding With Less Electroded Material," THE IRON AGE, April 30, 1942, describing the Lincoln Fleet-Fillet technique. Several other welding equipment suppliers had independently developed similar processes and by now practically all are recommending it where it is applicable.*

The development program covering the application of deep fillet welding consisted of three steps:

1. The accumulation of physical data
2. The establishment of production procedures
3. The application of these procedures to quantity production.

The first two parts of this program and proposed procedure and policy relating to certain phases of the third part, have already been covered in a previous article by the same authors, entitled "Deep Fillet Welding Technique and Application," published in *The Welding Journal*, June, 1943.

In brief, the three fundamental features of this technique are:

1. The proper welding current must be selected, which is measured for the sake of convenience and accuracy in terms of the amount of electrode consumed in unit time (burn off rate in inches per minute). The proper burn off rates for each design size of weld are given in Table I.
2. The proper arc length and electrode angle are essential. A short arc is required and best results are obtained by lightly dragging the electrode with the coating in contact with the two plates at all times. The proper electrode angles in flat and horizontal position work are shown in Table I.
3. A high travel rate is essential to obtain the desired savings in time and material. If other features of the technique are adhered to, the strength of the weld will be independent of its gage size and the welding speed, provided good appearance and freedom from holes, cracks and undercut are maintained.

At the high travel rate, less material will be deposited per unit length of weld and the saving in welding time is obvious. Recommended travel speeds of 12 in. per min. for flat position and 10 in. per min. for the horizontal position have been established in an effort to secure uniform results and at the same time take advantage of reasonable savings in time and materials.

The use of a watch or other timing device to check welding speeds on the job is impractical, and after an operator has developed reasonable facility with the technique, timing of travel speed is unnecessary. A close check can be maintained on welding speed by using the data in Table II, which shows the length of weld deposit that will be obtained if the proper current and recommended travel speeds are used.

The use of clip-on type ammeters offers a quick check on welding currents. This type of meter overcomes the disadvantage of meters directly connected to the welding generator in that it is less subject to shock and abuse, and by using the same meter for a large group of machines any variation between meters is obviated. Furthermore it can be readily calibrated daily. It should be noted that different electrodes require different currents to consume the same amount of electrode per unit time. Hence a table of currents and burn off rates is desirable for use with the meter. An alternative procedure is to recalibrate the scale of the meter to read directly in burn-off rate for any electrode or group of electrodes.

Immediately upon completion of the

development work in the laboratory, steps were taken to put this technique into operation. Since only a few of the 7500 welding operators in this yard had had any connection with the proposed procedure, the first step in the application to production was a training and certification program for electrodes and operators. In the absence of any approved qualification procedure by the American Bureau of Shipping or the American Welding Society specifically applicable to fillet welds, the following procedures for qualification of electrodes and operators were drawn up by the welding engineering department and approved locally by representatives of the American Bureau of Shipping and the United States Maritime Commission. These procedures have subsequently been approved by David Arnott, chief surveyor of the American Bureau of Shipping, to cover qualifications at the California Shipbuilding Corp. only.

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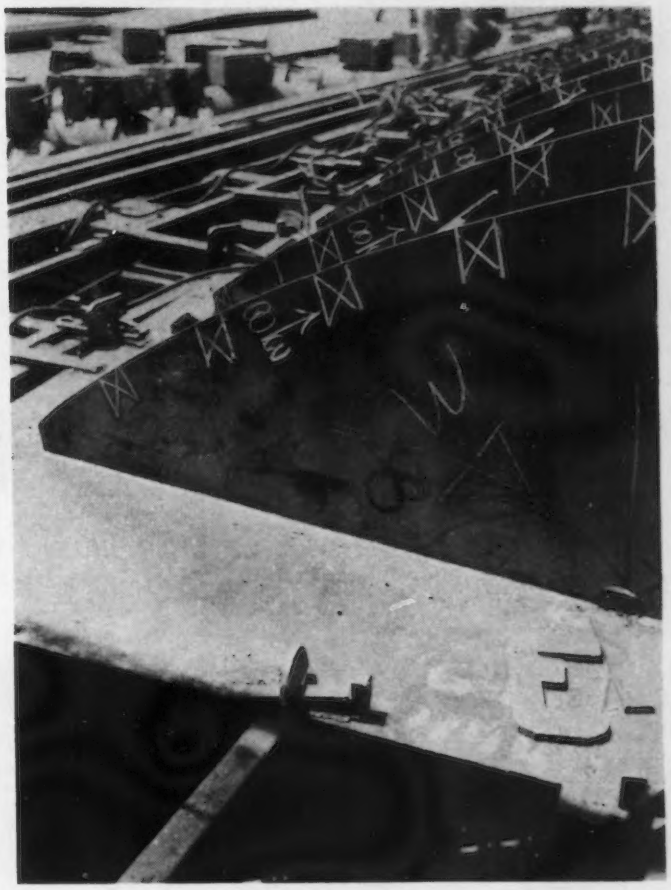

FIG. 1 — Vertical floors deep fillet welded to the top tank of an inner bottom section.

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## Qualification of Welding Electrode

"A cross welded specimen using ½ in. plate with four fillet welds of ⅜ in. nominal fillet size shall be made up using Fleetweld No. 11¼ in. rod for two fillet welds on one side of the specimen. Welding technique shall be in accordance with approved Fleet Fillet procedure. (Burn off rate of 11½ in. per min.) The welding rod to be qualified shall be used to make the two fillet welds on the opposite side of the specimen using exactly the same welding technique as used for the two Fleetweld No. 11 fillet welds. The two fillet welds made with the rod to be qualified shall be made on cold material; i.e., no heat from other welding shall exist in the sample.

"Two tensile samples and one etched sample shall be cut from the specimen—samples to be at least 1 in. in length. Average tensile strength shall be at least equal to that strength as given for Fleet Fillet ⅜ in. nominal size weld (28,100 lb. per lineal in.). Etched samples shall show proper penetration and appearance of weld structure."

## Qualification of Welding Operators For Deep Fillet

"Welding operators shall be certified to use the deep fillet welding technique (Lincoln Electric Co.'s Fleet Fillet technique) as follows:

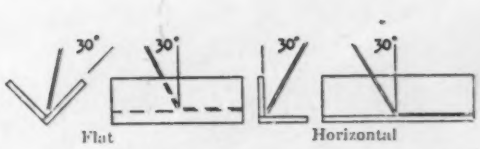
"Welding operators shall be given instructions in technique of deep fillet welding by competent instructors and shall deposit on a test sample a deep fillet weld of predetermined size. Weld sample shall be macro-etched on a cross section and weld must measure with at least the penetration that is required for selected size of weld. The appearance of the weld deposit must be sound and free from defects.

"Qualified welders shall be furnished with qualification cards signed by the testing engineer showing operator's name and badge number and indicating that he has been tested and qualified for deep fillet welding technique."

It will be noted that Fleetweld No. 11 electrode manufactured by the Lincoln Electric Co. was selected as a comparative standard. This selection was made because the Lincoln company had already secured tentative A.B.S. approval of this electrode for use with the Fleet Fillet welding technique. The American Bureau of Shipping has suggested the use of conventional fillets for comparative purposes, but the data available comparing the relative strength of deep fillet welds made with Fleetweld No. 11 and other American Welding Society Type E 6030 electrodes and conventional fillets is so extensive that there is very little difference between standards. The American Bureau of Shipping has made the choice of standards optional with the California Shipbuilding Corp.

### TABLE I

### Procedure for Deep Fillet Welding Down-hand Position, Using AWS E-6030 Heavy, All-Mineral Coated Electrodes




| Drawing Fillet Size In. | Electrode Size In. | Recommended Travel Speed In. per Min. | | Electrode Burn-Off Rate In. per Min. |
|---|---|---|---|---|
| | | Flat | Horizontal | |
| 3/16 | 3/16 | 12 | 10 | 11½ |
| 1/4 | 3/16 | 12 | 10 | 15 |
| 5/16 | 1/4 | 12 | 10 | 10 |
| 3/8 | 1/4 | 12 | 10 | 11½ |
| 7/16 | 1/4 | 12 | 10 | 12½ |
| 1/2 | 1/4 | 12 | 10 | 14 |
| 1/2 | 5/16 | 12 | 10 | 12 |

To date 12 different brands of electrodes of the AWS E 6020 and E 6030 classifications have been tested under the above qualification procedure and approved by the local surveyor of the American Bureau of Shipping for deep fillet welding in this yard. These 12 brands cover most of the principal manufacturers of welding electrodes in the United States.

## Training Operators

Nearly 2000 welding operators have been instructed and tested under the conditions outlined in the paragraph on qualification of welding operators. The policy of instruction has been to give a short discussion of the principal features of the technique to a small group of men followed by a demonstration where each individual can try his hand. After running two or three electrodes the average operator is quite capable of making an acceptable test plate. However, unless the operator is unusually attentive and interested it is usually necessary to give additional instruction on the job. It has been the policy of the production departments in this yard to have instructors closely supervise the work of all deep fillet crews. These instructors keep careful watch on the electrode burn-off of each man and correct electrode angle and see that proper arc length is maintained. This "on-the-job" instruction makes it much easier to show a man the results of his errors and to give additional information on handling craters, weld failures, undercut, etc. The most common tendency is for the operator to hold too long an arc, the usual result of which is serious undercutting.

The present policy of this company is to include instruction in flat and horizontal fillet welding using both conventional technique and deep fillet technique as a part of the regular course of instruction in its training school.

An identification card is issued to all deep fillet operators showing the operator's name, badge number, and the positions in which he is qualified. The reverse of this card (see Table I) shows the proper electrode angles, speed and burn-off rate for the most common applications for handy reference.

## Application Gradual

The application of these procedures to production welding has been a gradual one. In general, the procedure has been to select first those sections with the greatest amount of flat or horizontal position work, which are to be welded with continuous fillet welds. When a subassembly has been selected for welding with the deep fillet technique, a letter is sent to the company inspectors, the A.B.S. local surveyors, and the U. S. Maritime Commission inspectors, notifying each group of the change in welding procedure and the hull on which the change will be effective. This information must also be turned over to all groups concerned with the inspection and mark-up of unsatisfactory welding so that these welds will not be marked to be built to gage size after the subassembly reaches the shipways. In addition, representatives of the American Bureau of Shipping and the U. S. Maritime Commission are present as each new subassembly section is welded for the first time. They deserve a great deal of credit for the helpful consideration they have shown during the stages of application of this technique.

The plate shop handles nearly all of welding on positioners and has been able to adopt the technique much more readily than other welding groups in this yard. This is because the shop uses a smaller group of welders, all of whom have had more experience in the use of large electrodes of the type used with this technique. In addition, work in the flat position has less operating difficulties than that in the horizontal position. The plate shop welders were able in a few weeks to convert nearly 100 per cent of their flat and horizontal position continuous fillet welding to use of the deep fillet technique. The only exceptions have been a few subassemblies of such size and rigidity that they do not lend themselves to fabrication with the technique, as will be noted later.

The adoption of these procedures

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FIG. 2 — Forward deep tank flat welded with deep fillet welding technique and (below) detail of typical weld.

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by the subassemblies division has been a somewhat slower process. This has been due to a larger group of personnel to be trained and a more cautious approach, prompted by the greater technical difficulties encountered while welding in a horizontal position. At this time, nearly all of the flat and horizontal position continuous fillet welds are made using this technique in both the shop and on the assembly skids. This represents about 16,000 ft. of daily production welding or approximately 30 per cent of the production of these two departments. A large portion of the remaining work performed by these departments is increment welding which has not yet been changed over because of the problem of filling craters.

Figs. 1 to 3 show examples of the deep fillet welding now being produced at this yard and the conditions under which they are being made. Studies made at random show that actual savings of more than 35 per cent in time and 25 per cent in electrode consumption can be realized by using this technique. For example, on a small bulkhead section where channel and H-section stiffeners are continuously welded, the following figures were obtained on 1365 ft. of 5/16 in. horizontal fillet welds:

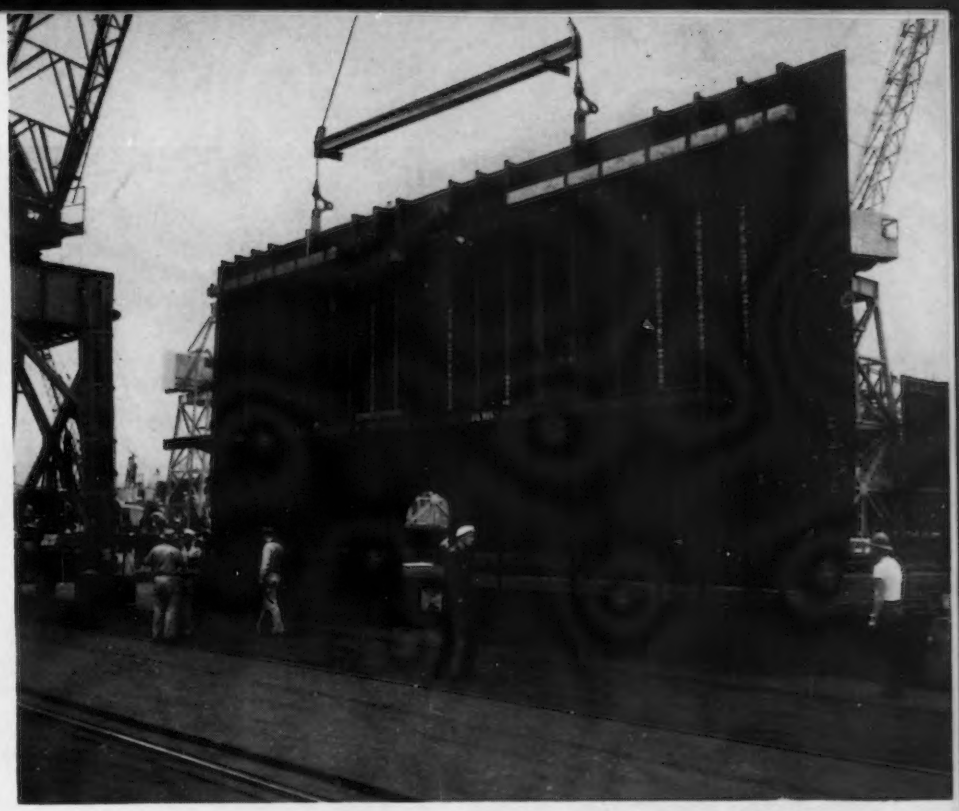

Fig. 3—Typical bulkhead welded using deep fillet welding technique.

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| | Conventional Technique | Deep Fillet | Savings | Per cent Saving |
|---|---|---|---|---|
| Manhours | 145.6 | 91.0 | 54.6 | 37.5 |
| Pounds of Electrode | 459.5 | 292.5 | 117.0 | 25.5 |

On one of the larger inner bottom sections, weighing 34¾ long tons, conventional technique used in welding the vertical floors to the tank top, was replaced by deep fillet. In this section, 1335 ft. of 5-16 and ⅜ in. horizontal fillet welding was changed to the deep fillet technique. The following savings were realized:

| | Conventional Technique | Deep Fillet | Savings | Per cent Saving |
|---|---|---|---|---|
| Manhours | 292 | 160 | 132 | 45.2 |
| Pounds of Electrode | 485 | 360 | 125 | 25.7 |

One welding operator has been known to produce 290 ft. of sound 5/16 in. horizontal fillet weld in an 8-hr. shift. While this is an exceptional case, it is indicative of the ultimate result which can be attained. This figure should be compared with the daily average of about 60 ft. for all welders in the same department.

While the savings illustrated above are considerable, they are by no means the ultimate. As the welding operators develop more skill, savings in manhours and electrodes should approach 50 per cent for conditions where this technique is applicable.

## A.C. Preferred

Deep fillet welds made with alternating current are superior in strength to welds made under the same conditions of burn-off rate with direct current. For this reason and because of the elimination of magnetic blow, the use of alternating current is preferred to direct current, although either type of equipment will produce satisfactory results.

In selecting machines for either alternating or direct current it should be remembered that the required currents will be from 15 to 25 per cent greater than those normally used to produce the same size weld using conventional technique with one or more passes. We have found that a d.c. machine of 300-amp. rated capacity will be satisfactory for ¼ and 5/16 in. deep fillet welds, but this equipment will probably not produce satisfactory deep fillet welds for the ⅜ in. size. There may be exceptions to this statement if the operating factor of the equipment is low or the overload capacity of the particular machine is high; however, for machines which are to be operated 168 hr. per week at an operating factor of 40 per cent or greater, a machine of 400-amp. capacity is recommended for ⅜-in. deep fillet welds.

Electrode holders should be selected on the same basis as the machines. Holders of 300 amp. nominal capacity, when carrying 250 to 275 amp. at a high operating factor, become so hot that operators cannot hold them even with heavy gloves. For all deep fillet welding, with electrodes of ¼ in. diameter or greater, 500-amp. holders or holders with forced ventilation are recommended.

Care must be taken with ground connections to see that they are made secure and with a sufficient area of contact to carry the heavy currents without excessive heating. Ground bus made of steel strap is to be

avoided unless it is known that the current carrying capacity is sufficient to prevent heavy power loss. When ground connections are welded into place, the cross-sectional area of the weld metal must be equal to the cross-sectional area of the steel strap.

### Major Production Difficulties

The work of development on this technique and the experience gained in the training of operators indicated that welds made following these established procedures were particularly susceptible to the common problems of all welding. The problems of eliminating cracks, holes, and undercut and of maintaining distortion within allowable limits are constantly reoccuring. Fortunately, however, most of the causes of these difficulties are known even though the mechanism of the failures may not be known.

In general it has been found that most of the unsatisfactory welding can be traced to the welding operator who has been lax in conforming to procedures. Many welding operators, particularly those who have been welding for a year or less and whose training has not been well founded, fail to recognize the advantages of the drag technique. The feeling seems to exist with a majority of old time operators that a weld cannot be made unless the electrode is oscillated. These conditions emphasize the importance of careful and thorough training and adequate and informed supervision. More will be said later about the causes and cures, but it is significant to note that adherence to procedure is the most important factor in the elimination of unsound deep fillet welds.

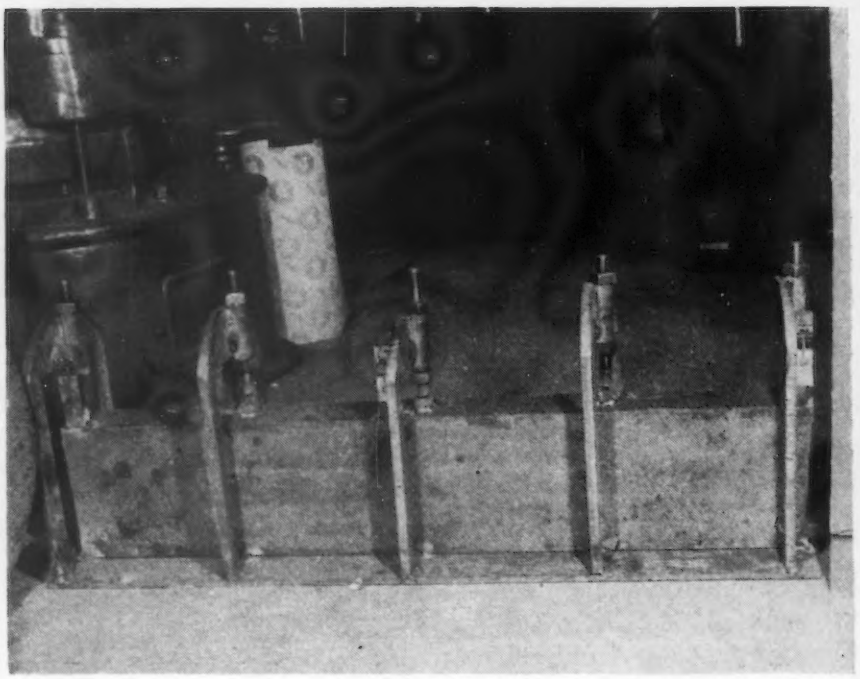

FIG. 4—Side view of setup for fillet weld contraction test, showing location of deForest scratch strain gages.

Considering the more important problems in detail, the most common and most easily corrected fault in horizontal fillets is undercutting of the vertical plate. In almost all cases this condition results from incorrect technique although undercut often accompanies other conditions of unsatisfactory welding caused by damp coating or coating not up to specifications. It was found early in our investigations that an electrode angle of 30 deg. to the vertical is essential to prevent undercut even though a greater angle might seem more desirable to increase penetration. Secondly, at the high heats used with this technique, the shortest possible arc is necessary for control. This means that a drag technique with continuous contact between the electrode coating and both plates is essential. When the condition of the coating is the cause of undercut it is usually the result of inadequate arc stabilization accompanied by improper slag coverage.

The presence of blow holes in the finished weld fortunately is not common. During our early investigations considerable difficulty was experienced with this condition but since the application of these techniques to production welding, cases of this condition have rarely been reported. It has been noted that certain brands of electrodes are more susceptible to the formation of blow holes than others. Again this condition may be related to the moisture content of the electrode coating. A second cause of blow

TABLE II

Length of Weld Deposit When Operating at Proper Travel Speed With Proper Electrode Burn-Off

| Design Fillet Size In. | Electrode Size In. | Electrode Length In. | Electrode Burn-Off Rate In./Min. | In. of Weld Deposited With Proper Current and Recommended Speed Leaving 2 in. Stub In. per Min. |
|---|---|---|---|---|
| | | FLAT POSITION | | |
| 3/16 | 3/16 | 14 | 11 1/2 | 12 1/2 |
| 3/16 | 3/16 | 18 | 11 1/2 | 16 3/4 |
| 1/4 | 3/16 | 14 | 15 | 9 1/2 |
| 1/4 | 3/16 | 18 | 15 | 12 3/4 |
| 5/16 | 1/4 | 18 | 10 | 19 |
| 3/8 | 1/4 | 18 | 11 1/2 | 16 3/4 |
| 7/16 | 1/4 | 18 | 12 1/2 | 15 1/4 |
| 1/2 | 1/4 | 18 | 14 | 13 3/4 |
| 1/2 | 5/16 | 18 | 12 | 16 |
| | | HORIZONTAL POSITION | | |
| 3/16 | 3/16 | 14 | 11 1/2 | 10 1/2 |
| 3/16 | 3/16 | 18 | 11 1/2 | 14 |
| 1/4 | 3/16 | 14 | 15 | 8 |
| 1/4 | 3/16 | 18 | 15 | 10 1/2 |
| 5/16 | 1/4 | 18 | 10 | 16 |
| 3/8 | 1/4 | 18 | 11 1/2 | 14 |
| 7/16 | 1/4 | 18 | 12 1/2 | 12 3/4 |
| 1/2 | 1/4 | 18 | 14 | 11 1/2 |
| 1/2 | 5/16 | 18 | 12 | 13 1/4 |

holes has been found to be improper grounding of the work.

The formation of cracks is by far the most important condition affecting the production of sound welds using the deep fillet technique. These cracks form at temperatures in the blue brittle range and are always longitudinal to the weld. In the cross-section the cracks start at the surface at approximately the center of the weld and tend to curve off into the plate (usually the vertical). No root cracks or transverse cracks have been

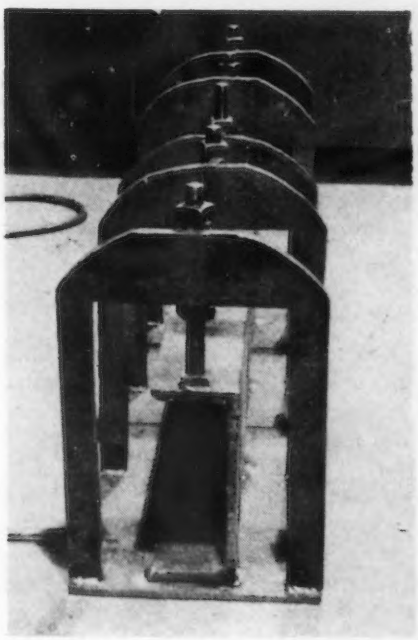

FIG. 5—End view of setup shown in Fig. 4.

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encountered in over 3000 specimens. Once a weld has cooled through the blue brittle range without the formation of cracks, no failure has occurred as a result of subsequent welding operations on the opposite side of the plate or as a result of subsequent loading of the welds within the limits of the designed stress range.

When first encountered, these cracks were attributed to a high sulfur content because of the similarity of the failure to failures encountered in Unionmelt welding known to be particularly susceptible to sulfur cracks, and the similarity of the techniques to that of Unionmelt. This theory is not well substantiated by analysis of plate material, and sulfur is now considered to be only a contributing factor to weld failures. Evidence tends to favor the theory that the cracks are stress failures in the blue brittle range caused by a combination of stresses introduced into members by the fitting procedures and welding stresses inherent in the welding process. This condition is aggravated by a combination of residual welding stresses which result from the unusual distribution of heat produced by the increased welding speed.

## Moisture in Coatings

Again, conditions in the electrode coating tend to aggravate the tendency toward cracking. Improper slag coverage tends to form cracks in exposed portions of the weld while protected portions of the same weld do not crack, proving that cooling rate has an effect although no evidence of a martensitic structure has been found. Unusually high moisture content of electrode coatings seems to favor cracking. The critical range of moisture in the coating seems to be between 4 and 4.5 per cent. Moisture content less than 3 per cent gives no difficulty from cracking although its effect may be apparent in the arc characteristics and in the slag formation. A maximum of 2 per cent moisture content should be established to avoid difficulties on this score.

Moisture absorption of electrode coatings is a much more troublesome problem at this time than it was a few years ago when hermetically sealed metal containers were available. That the present cardboard containers are effective in excluding moisture for only about two weeks has been demonstrated in our laboratory in a recent series of tests, the results of which are tabulated in Table III. Furthermore, once moisture has penetrated this type of container, the only effective way of drying or rebaking the electrode is to remove it from the carton. The additional handling is an expensive and time consuming operation.

The most effective method of control of moisture is to provide warehousing with controlled humidity. In

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Fig. 6—Longitudinal hatch girders, showing longitudinal stiffeners in place.

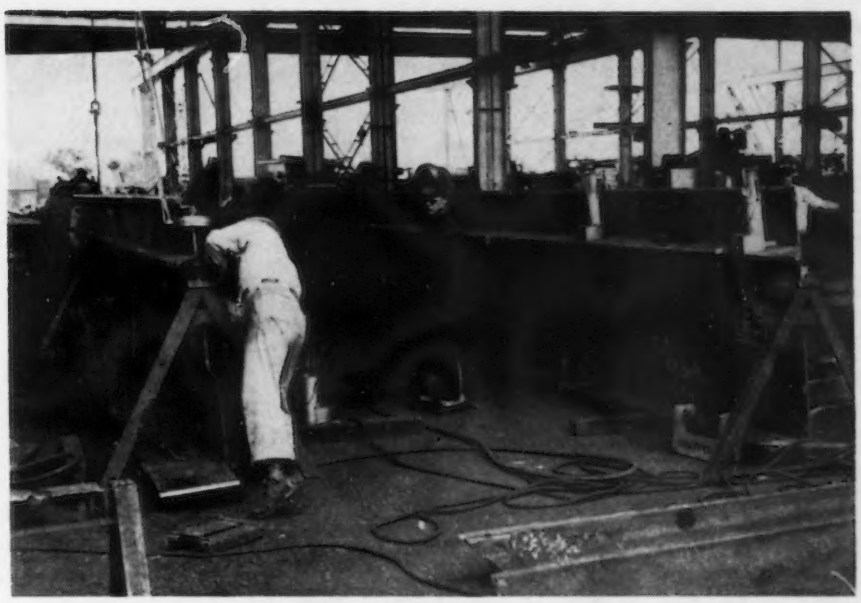

TABLE III

Results of Tests on Moisture in Electrode Coatings In and Out of Containers

| Electrode | Moisture as Received | MOISTURE AT THE END OF: 1 Day | 2 Days | 3 Days | 4 Days | 7 Days | 14 Days | 21 Days | 28 Days |
|---|---|---|---|---|---|---|---|---|---|
| "A", E 6010 in container | 1.12 | 1.12 | 1.12 | 1.12 | 1.16 | 1.65 | 3.05 | 5.06 | 6.50 |
| "A", E 6010 removed from container | 1.12 | 5.07 | 7.35 | 7.45 | 7.50 | 6.93 | 7.52 | 7.25 | 7.46 |
| "B", E 6012 in container | 0.96 | 0.96 | 0.96 | 0.98 | 1.08 | 2.05 | 3.21 | 4.18 | 5.23 |
| "B", E 6012 removed from container | 0.96 | 2.21 | 3.03 | 4.12 | 4.61 | 4.85 | 5.20 | 5.75 | 5.57 |
| "C", E 6030 in container | 0.45 | 0.45 | 0.46 | 0.48 | 0.45 | 1.35 | 2.40 | 3.65 | 4.83 |
| "C", E 6030 removed from container | 0.45 | 1.97 | 2.91 | 3.34 | 3.97 | 4.63 | 5.59 | 6.25 | 6.01 |
| "D", E 6030 in container | 0.46 | 0.46 | 0.46 | 0.50 | 0.58 | 1.21 | 2.03 | 3.21 | 4.40 |
| "D", E 6030 removed from container | 0.46 | 1.76 | 2.81 | 3.18 | 3.72 | 4.41 | 5.32 | 5.45 | 5.86 |

NOTE: All figures are in per cent. of contained moisture.

many climates, warehouse space heated to a few degrees above ambient temperature may be sufficient, while in extreme climates complete air-conditioning may be required.

In addition, care must be taken in the distribution system since the moisture absorption is accelerated when electrodes are removed from the containers. Distribution stations should be provided with heated cabinets for bulk storage. Stocks removed from containers or heated storage should be distributed within 48 hr. after their removal.

The most important single cause of cracking is that of stresses introduced into the members through the fitting procedure. When steel is fitted with metal-to-metal contact at all points, weld failures result from one of two causes:

(1) Stresses introduced into the members by dogging too tightly.

(2) Shrinkage stresses in the weld incapable of release because of the restraint of one member with respect to the other.

For example, one of the first applications of deep fillet welding was in the welding of side shell frames (12 x 14 in. by 40 lb. channels) to subassembled side shell panels (26.8 lb. plate). The weld used was a 5/16 in. (design side) horizontal fillet. Fitting practice called for metal-to-metal contact at all points as is the practice for similar riveted construction. Under these conditions weld failures were so numerous that the use of deep fillet welding was discontinued in favor of a two pass conventional fillet. Later, the fitting procedure was changed to allow a feeler to pass between the channel and the plate in an effort to reduce distortion. With this fitting procedure, failures in the welds are rare with the deep fillet technique.

To measure the amount of contraction to be expected under these conditions, a section was set up in the laboratory as shown in Figs. 4 and 5. A space of approximately 0.050 in. was left between the channel and the plate which was carefully measured with feeler gages at five points at which De Forest scratch strain gages were attached to follow the behavior of the section during welding. The specimen was welded with a 5/16 in. (design) horizontal deep fillet weld continuously from one end to the other, first along the toe and then at the heel of the channel. The specimen was cut adjacent to the five established points so that feeler gage measurements could again be made. These measurements together with the record of the strain gages indicate that the average contraction in the weld is about 0.010 in. at the toe and 0.020 in. at the heel.

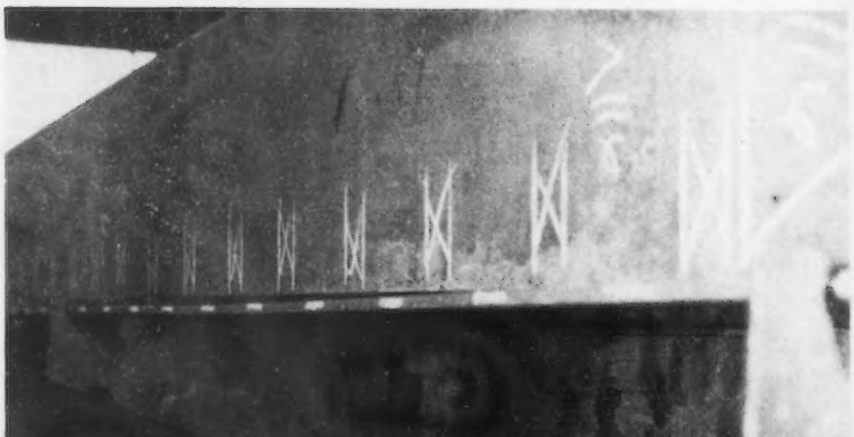

FIG. 7—Longitudinal hatch girder placed in jig before tacking, showing deflection of the web before fitting.

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## Proper Fitting Required

The results of this test and experience in production show the need for proper fitting technique. To insure proper fit with adequate clearance but without excessive gap, a "Go and Not Go" feeler gage is recommended, which has an end thickness of 0.015 in. which will enter the gap and a blade thickness of 0.025 to 0.030 in. which will not pass. The use of easily compressible or combustible spacer materials such as paper or string may be found advantageous in determining and maintaining the proper gap. Such materials will be largely consumed during the welding operations and any remaining material will not produce sufficient restraint to cause weld failures.

Some early applications of these procedures indicated that many large and extremely rigid sections would not be suitable to this technique. A typical example is the longitudinal hatch girder shown in Fig. 6. Welds joining the channel stiffener to the girder invariably would fail during the welding operation. It was later found, however, that deep fillet welding of other extremely rigid members, such as H-sections to bulkheads and inner bottom floors to tank tops—all extremely rigid and critical to weld failures—could be accomplished successfully by a skip pattern in which all tack welds were left in place until a sufficient amount of production welding was completed to hold the two members in place. It was found that the high welding currents were sufficient to completely melt out the tack welds.

This procedure was applied to the hatch girders mentioned above and they were successfully welded. Fig. 7 shows the deflection which this member possesses when unsupported in the welding jig. It is a good indication of the amount of stress to which the hot weld deposit may be subjected when a tack weld is released.

Distortion and residual stresses are important factors in all welding which must receive careful consideration. As in the case of conventional welding, very little is known about the plastic behavior under the conditions imposed. It can be readily demonstrated that with the deep fillet technique distortion transverse to the weld (angular distortion) is materially reduced in plates up to ½ in. in thickness. This is the result of the more uniform shrinkage, caused by the greater penetration of heat. Etched specimens show that the heat affected zone of deep fillet welds completely penetrates plate thicknesses up to ½ in.

Tests made to determine the longitudinal distortion have been very inconclusive. Longitudinal distortion seems to lie within almost the same

limits for both conventional and deep fillet welds.

Fortunately, distortion has not shown itself to be a serious problem except in a few cases where extremely close tolerances are required as to fairness. Satisfactory work is being produced with only the normal precautions to prevent distortion.

Residual stresses are a much more serious problem and it is much more difficult to find a solution. About all that is known is that deep fillet welds behave in very nearly the same manner as conventional welds in all laboratory tests of tension and bending, with a slight advantage favoring the deep fillet welds. Tension tests made at intervals of 1 to 3 min. after welding indicate that there is little, if any, difference in strength before and after cooling stresses are introduced. All evidence points to the conclusion that the plastic behavior of deep fillet welds is the same as for conventional welds. The authors are of the opinion that deep fillet welds are equal to conventional fillet welds of comparable size in all respects.

### Limits of Application

As explained earlier in the report, there was a period in the development of this technique when it appeared that some limitations would have to be imposed because of rigidity and size of sections. Subsequent developments have shown, however, that there need be no limitation on the production of flat and horizontal continuous fillet welds provided procedures can be followed as outlined. This means that fitups must have less than 3/32 in. gap and must not show metal-to-metal contact at all points. A 0.010 to 0.015 in. spacing is preferable. The electrode angles must be maintained within a few degrees of those established. This means that care must be taken when welding on the inside of most inverted angles. Angles with equal legs can not be welded with this technique in the horizontal position because the electrode angle to the vertical would have to be 45 deg. or more.

The limitation of deep fillet welding to continuous welds is the result of a production problem—that of filling craters on interrupted runs—rather than a technical problem. Without the use of a "crater eliminator," it has not been found economical to make increment welds with this technique.

The experience gained through this work has enabled us to develop related techniques for increment welds wherein fillets up to and including ⅜ in. can be made to size in one pass, which represents a considerable increase in welding speed over conventional multipass techniques. This work, however, is beyond the scope of this paper.

The authors wish to express their appreciation to the supervisors and personnel of the various welding departments at the California Shipbuilding Corp. for their cooperation. Particular recognition should go to George H. Davies, superintendent of the plate shop, and to J. H. Moses, superintendent of subassemblies, who contributed generously of their personnel so that a thorough testing program might be carried out.

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# Increasing the Life of Hand Stamps

By E. K. SPRING,
*Chief Metallurgist*
and
A. R. UHL
*Assistant Metallurgist*
*Henry Disston & Sons, Inc., Philadelphia*

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OVER the years there have been many painful injuries received in the metal and allied industries from splinters or fragments flying from the heads of hand tools. These tools are of the types of chisels, center punches, drifts, steel stamps and the like.

There is probably more use being made today of steel stamps than ever before in history since so many parts of machines for the fighting forces are being stamped for identification. Furthermore, many of the parts being stamped are heat treated to a hardness appreciably above that of annealed steel and hence shorten the lives of the stamps employed.

Observation of the performance of several makes of steel stamps suggests they can generally be improved at the shank end—the one given the lesser consideration. Invariably after some use, the shank or end struck with the hammer mushrooms out until the enlarged top can be cold worked no further by the hammer and splits. With continued use a sliver soon flies off, frequently causing painful injury to the operator. It would appear that few of the stamps produced by various makers with which the writers have had contact have been subjected to improvement at the shank end.

In many instances it has been found the total life of stamps could be prolonged by so heat treating stamps as to secure a stronger, tougher condition at the head. Stamps previously treated on the marking end can be toughened and strengthened at the back end by heating it for a short distance in lead or salts and oil quenching.

Another way, currently used, is to oil quench the stamp all over from about 125 deg. F. above the critical temperature and draw the temper to 45-50 Rockwell C. The stamp is then heated on the cutting end to just above the critical, quenched and tempered just enough to relieve the working edge, leaving it file hard. This double treatment produces a stamp with a heat-treated top resistant to distortion under the hammer, and the chances of formation of slivers are almost completely eliminated.

Further improvement can be obtained by rounding up the edge at the hammer end. A conservation of labor and a prolonged life of stamp can be achieved from this type of treatment. The method of double treating of stamps is offered to the trade as both a safety measure and a means of conserving steel.

# CREEP AND HEAT RESISTANT S

BASICALLY all alloy steels which can be forged and rolled can also be used in the manufacture of castings. A particular discussion concerning creep resistant castings would therefore be superfluous in view of the voluminous literature regarding the hot worked steels of this type, were it not for some peculiarities of the casting process which have led to the development of definite castings alloys.

While in the manufacture of rolled or forged parts, the hot workability of the material is one of the most important properties, the foundryman is particularly interested in having a steel of high fluidity and good mold filling properties. The fluidity increases with overheating beyond the melting point, within certain limits set by the furnace lining and mold material. Furthermore the primary grain will be coarser the higher the casting temperature. The grain size of alloys which do not pass through a recrystallization zone cannot be corrected for grain size by subsequent heat treatment and in castings there is no hot or cold deformation which might result in grain refinement. Conversely, castability can be improved by the addition of elements which lower the melting point without requiring an increase in the casting temperature, the most important of these elements being carbon and phosphorus.

However, carbon and phosphorus in heat resistant castings exert a detrimental effect upon the susceptibility of the casting to hot cracks and also upon the resistance to scaling, tensile properties, etc., of the finished casting. In addition the quantity, distribution and viscosity of very finely dispersed slag particles is probably influenced by the manner of melting, with a consequent effect on the casting properties.

Thus the casting properties of any steel vary with the manufacture in spite of identical chemical composition and casting temperature, with facility of operation decreasing in the following sequence:

Acid Bessemer furnace
Acid oil heated rotating furnace
Acid high frequency furnace
Acid arc furnace
Basic arc furnace

This rule applies equally to unalloyed steel castings and to highly alloyed heat or acid resisting steel castings. The use of a Bessemer converter is out of the question where chromium alloys are made. For the melting of heat or corrosion resisting castings generally, the acid process is preferred. The high frequency furnace predominates, because it is possible to melt small quantities of a special composition and have at the same time great overall capacity, low losses, no carburization and an excellent mixing of the steel bath. The arc furnace is being used for larger quantities. The Brackelsberg furnace is also in use, and is particularly suited for the melting of cast iron resembling chromium castings. For manganese-rich steels which, however, have hardly been used up to now in the field of heat resisting castings, the basic process must be used because of possible manganese slagging.

High temperature cracks play the same part in the manufacture of castings as red shortness in hot deformation. These cracks occur particularly with alloys in which on solidification small amounts of residual liquids remain on the grain boundaries over a certain temperature interval. This danger is particularly accentuated wherever hypo-eutectic alloys solidify, carrying small amounts of residual eutectic liquid toward the end of the solidification process. The shrinkage which has already taken place in the casting generally will bring about cracks due to the pressure exerted by the liquid metal. Also the formation of micro-blowholes is a greater danger in such alloys than in others in which pure metals or eutectic alloys solidify at a constant temperature, or at least pass through a shorter solidification temperature range. These considerations have to be borne in mind when the use of high carbon or phosphorus additions is considered for the improvement of castability.

While crystal segregations which influence toughness unfavorably can be lessened by proper heat treatment, it is of course impossible to remove micro-blowholes in castings. Such faults must be avoided by proper alloying and casting control.

The following main classes can be distinguished among high temperature steels: (1) Creep-resisting steels,

TAB

Chemical Composition and Mechanical Properties (Me

| Steel No. | Composition, Per Cent C | Si | Cr | Mo | Structure | Yield Limit Lb. Per Sq. In. | Tensile Strength Lb. Per Sq. In. | Elongation (Length = 5X Diameter) Per Cent |
|---|---|---|---|---|---|---|---|---|
| 1 | 0.2 | 0.5 | ..... | 0.4 | Ferrite-Pearlite | 35,000 | 64,000 to 78,000 | 22 |
| 2 | 0.3 | 0.5 | 0.8 to 1.2 | 0.4 | Ferrite-Pearlite | 43,000 | 78,000 to 92,000 | 20 |
| 3 | 0.2 | 0.5 | 2.5 to 3.5 | 0.4 | Ferrite-Pearlite | 57,000 | 78,000 to 92,000 | 20 |
| 4 | 0.2 | 0.5 | 4.0 to 6.0 | 0.4[1] | Ferrite-Pearlite | 64,000 | 85,000 to 100,000 | 15 |
| 5 | 0.2 | 0.5 | 14 | ... | Sorbite | 78,000 | 100,000 to 121,000 | 12 |
| 6 | 0.2 | 0.5 | 18 | ... | Sorbite | 92,000 | 114,000 to 135,000 | 8 |
| 7 | 0.2 | 0.5 | 18 | 2.0 | Sorbite | 100,000 | 128,000 to 150,000 | 5 |

[1] Possibly 0.4 per cent W in addition.
[2] Test piece of 0.4 x 0.4 x 2.16 in. with a 0.12 in. notch, and an 0.08 diameter bore of 2 mm. diameter.

# STEEL CASTINGS . . .

exposed at about 750 to 930 deg. F. to a high mechanical load; practically no scale attack but possibly decarburizing action by hydrogen under high pressure; essentially the stress is one of mechanical use at elevated temperature. (2) Heat resisting steels above 930 deg. F.; scaling attack by air or fuel gases, possibly by molten salts and metals, and little if any mechanical load; or similar corrosive conditions but heavier mechanical stresses.

## Creep Resistance

The alloys used in creep resisting steel castings are the same as those used in hot formed (rolled or forged) steels. Since unalloyed cast steels as well as cast iron have an adequate scale resistance up to about 1020 deg. F., alloy additions are mainly used to increase creep resistance. It is well known that the design of parts which are supposed to operate at elevated temperatures depends for permissible load not on the yield point at temperature, but exclusively on the creep strength determined in the short or long term test. Cast materials have always a somewhat greater creep strength at high temperatures because of their coarser grain than the hot deformed steels of the same composition.

Table I summarizes properties of alloys which have been in use in the manufacture of creep resistant steel castings. Molybdenum is the most essential bearer of creep strength. The steels of this group do not differ

***. . . The alloys used in Germany in the manufacture of creep and heat resistant castings are described in this article by F. Schulte, translated from Stahl und Eisen. The influence of the casting process on alloying practice and on strength properties, scaling resistance, sensitivity to gases and temperature changes, etc., is fully discussed.***

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in composition from the corresponding rolled qualities. The casting properties are about the same as those of unalloyed casting steel, but steels 3 and 4 require somewhat larger runner cups. Steels 1 and 2 are used mainly for parts of superheated steam plants such as valves, tube turnings and turbine housings. Steel 3 is particularly distinguished by its great toughness and is therefore suited for parts in maximum pressure steam plants in which dependability is a first requirement. Also, continued heating at about 930 deg. F. will not cause any noticeable decrease in impact strength. The somewhat higher chromium content offers improved resistance toward scale attack by superheated steam. Incidentally, this steel casting excels also in cold toughness down to about —72 deg. F.

Steel 4 has been designed especially for furnace parts in oil cracking plants. Apart from the stability toward hydrogen (F. Naumann *Stahl und Eisen* 1938, pp. 1239 to 1250), there is also an improved resistance, due to increased chromium content, against chemical attack by hydrogen sulfide which occurs often in the coal hydrogenation processes. The molybdenum and tungsten contents, as carbide formers, support the protective action of the chromium against the hydrogen attack while at the same time increasing the heat strength. The data for the creep strength as given in Table I are valid for the tungsten-free steel; if tungsten and molybdenum are both added, the values are increased by 2800 lb. per sq. in.

At present the German report continues, an effort is being made to devise steel casting alloys which owe their creep resistance to more readily available alloying elements. Tests have shown that it is possible to replace molybdenum in steels 1, 2, and 3 by titanium or vanadium to attain creep strength values as outlined in Table I. Since both elements are strong carbide formers, carbon must be low lest the titanium and vanadium additions required should become unnecessarily great. These steels need rather high heat treating (1740 to 1920 deg F.) to bring a part of the titanium or vanadium carbide in solution. The creep strength, which probably depends on a finely dispersed precipitation of the carbides after tempering, is positively affected by the heat treat-

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an Values) of the Usual Heat Resistant Steel Castings.

| Reduction in Area, Per Cent | Notch Bars[2] Impact Strength, Ft. Lb. Per Sq. In. | Creep Strength, Lb. Per Sq. In. at 750 Deg. | 840 Deg. | 930 Deg. | Scale Resistance in Air up to, Deg. F. | Mean Coefficient of Expansion Between 68 and 1470 deg. F. (0.001 mm. per meter per deg. C) | Specific Gravity |
|---|---|---|---|---|---|---|---|
| 40 | 6.7 | 25,000 | 20,000 | 17,000 | 1020 | 13.0 | 7.8 |
| 40 | 5.6 | 30,000 | 27,000 | 22,000 | 1020 | 13.0 | 7.7 |
| 50 | 22.4 | 31,000 | 28,000 | 22,000 | 1110 | 13.0 | 7.7 |
| 40 | 5.6 | 37,000 | 30,000 | 25,000 | 1200 | 13.0 | 7.7 |
| 40 | 3.4 | 28,000 | 20,000 | 11,000 | 1380 | 12.0 | 7.6 |
| 20 | 1.1 | 34,000 | 23,000 | 15,000 | 1560 | 12.0 | 7.5 |
| 15 | 1.1 | 43,000 | 31,000 | 25,000 | 1560 | 12.0 | 7.5 |

ment. As both titanium and vanadium reduce the gamma-range there is danger in steels with a somewhat increased chromium content, such as Steel 3, that the heat treating properties may be lost because of alloy additions.

Titanium will reduce the impact strength of steel noticeably if added in quantities which improve the creep strength. This effect is pronounced in casting because of the lack of hot deformation. An explanation for the low notchbar impact strength of titanium-bearing steel castings cannot be offered at this time, particularly since the values obtained on unnotched impact test pieces and on tensile specimens are very good. Also the notch bar impact strength improves rapidly with increasing temperature and even above 210 deg. F. quite satisfactory values are attained. Fig. 1 shows the influence on the notch bar impact strength of a titanium bearing casting steel, of a diffusion anneal at very high temperatures, which preceded the actual heat treatment. (Test piece was 0.4 x 0.4 x 2.16 in. with a 0.12 in. notch and 0.08 in diameter bore at the end.)

It is therefore possible to increase considerably the notch bar impact strength of a chromium-titanium steel by such a diffusion anneal. There still seem to be certain influences which are not fully under control at this time, such as the wall strength, which act both on the primary crystallization and on the depth of penetration of the heat treatment. In vanadium bearing steels these difficulties have not been observed, so that at this time the development tends toward the application of creep resistant chromium vanadium casting alloy steels which have stood up well in practical tests in the past.

Steels 5, 6 and 7 (Table I) are scale resistant at higher temperatures, but are also being used at medium temperatures in the fatty acid industry because of their good chemical resistance. This is particularly true of Steel 7 which contains molybdenum, not to increase creep strength, but to improve its chemical qualities.

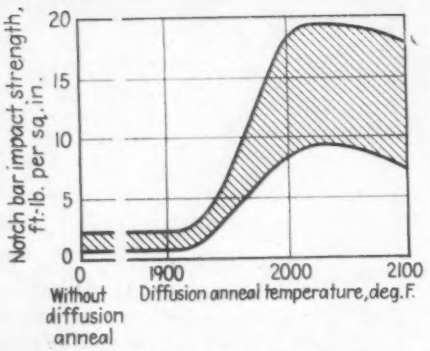


FIG. 1—Influence of a diffusion anneal at 1650 deg. F. and 1380 deg. F., before the actual annealing, upon the notch bar impact strength of a steel with 0.10 C, 3.10 Cr, 0.45 Ti.

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## Heat Resistance

Heat resistance embraces stability against the attack of air, gases, vapors and in special cases of liquid salts and metal baths at high temperatures, heat strength, resistance against change of strength properties in heating and creep resistance, that is, permanent volume change by a change in the crystal structure at high temperatures.

E. Scheil and K. Kiwit (*Arch. Eisenhuttenw*, 1935-36, pp. 405 to 416) have thoroughly investigated the mechanism of the attack of air and oxidizing gases upon alloyed steels at high temperatures and have arrived at the conclusion that in a scaling attack the iron migrates through the scale layer to the outside and is oxidized there. Protection by alloy additions against scaling can therefore be attained only when the additions cause the formation of a firmly adhering dense oxide skin which prevents the diffusion of iron and iron oxide. [Editor's Note: A recent German patent calls for the addition of small percentages (0.2 to 2 per cent) of calcium and cerium to heat resisting alloys.] It is also important for no low melting eutectics to be formed in this scale layer which would prevent the protective action.

Additions of chromium, aluminum and silicon, alone or together, lead to the formation of protective oxide layers. Of these elements, mainly chromium is used to form heat resisting steels, sometimes together with small additions of silicon and aluminum in order to increase scale resistance further. The action of chromium on scale resistance in air is shown in Fig. 2. While nickel alone has hardly any influence on scale resistance, its effect is increased noticeably when chromium, also, is used. Nickel acts favorably on the heat strength of heat resisting steels so that, apart from the heat resisting chrome steels, there are the austenitic chromium-nickel steels. Thus there are two groups of scale resisting cast steels: the iron-chromium alloys with comparatively low heat strength, and the

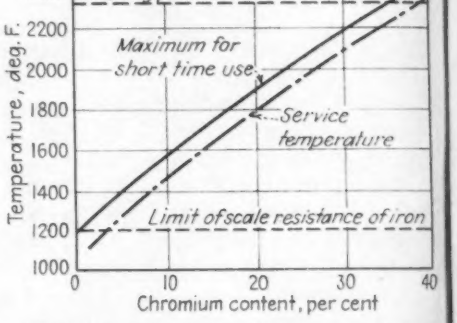


FIG. 2—Influence of chromium content on the scale resistance of steels containing 1 C and 1 Si.

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TAB

Properties of the Usual Heat Resistant

| Steel No. | Composition, Per Cent C | Si | Cr | Structure | Tensile Strength, Lb. Per Sq. In. | Elongation (Length = 5X Diameter) Per Cent | Bend Strength, Lb. Per Sq. In. | Bending Limit, In. |
|---|---|---|---|---|---|---|---|---|
| 8 | 0.5 to 1.0 | 1.0 to 1.5 | 5 to 7 | Pearlite | 92,000 to 114,000 | 8 to 6 | 120,000 to 128,000 | 0.98 to 1.18 |
| 9 | 0.5 to 1.0 | 1.0 to 1.5 | 12 to 14 | Pearlite | 85,000 to 107,000 | 6 to 4 | 114,000 to 120,000 | 0.71 to 0.79 |
| 10 | 0.5 to 1.0 | 1.0 to 1.5 | 16 to 18 | Pearlite | 85,000 to 107,000 | 4 to 2 | 107,000 to 114,000 | 0.59 to 0.71 |
| 11 | 0.5 to 2.0 | 1.0 to 1.5 | 20 to 22 | Ferrite + Carbide Mesh | 64,000 to 71,000 | ..... | 85,000 to 92,000 | 0.40 to 0.47 |
| 12 | 0.5 to 2.0 | 1.0 to 1.5 | 27 to 30 | Ferrite + Carbide Mesh | 64,000 to 71,000 | ..... | 85,000 to 92,000 | 0.40 to 0.47 |

*Basis of measurement is a permanent elongation of 1 per cent in 1000 hr.

iron-chromium-nickel alloys with high heat strength. As a third group there is the austenitic chromium manganese steel which combines good heat strength with limited scale resistance.

## Chromium Steel Castings

Table II gives the composition of the heat resisting chromium steels used for castings, the application of which becomes generally economical only above 1290 deg. F. The steels listed are very similar in composition to the hot worked scale resistant chromium steels but have generally a somewhat higher carbon content, thereby achieving higher fluidity, and making it possible to obtain a steel which can be heat treated up to 18 per cent chromium.

As is well known, chromium and silicon restrict the gamma area. Thus, a low carbon chromium steel with about 1.5 per cent silicon and about 14 per cent chromium will not touch the gamma area from the melting point down to room temperature and cannot be heat treated. Such ferritic steels form rather coarse primary grains on solidification, which decrease toughness and which can be refined only by hot working. In casting, no refinement of the crystal structure by hot work is possible and therefore the carbon content of cast alloys with 14 to 18 per cent chromium is increased so that the steel can be heat treated. Even so, it can be observed in steels 8, 9 and 10 (Table II) that toughness decreases with increasing chromium content. Steels 11 and 12 with 25 to 30 per cent chromium become subject to heat treatment only when they contain more than 1.5 per cent carbon. Then the carbide content in the structure is so great that no increase in toughness can be obtained. It is customary to use a carbon content between 1 and 1.5 per cent which imparts to the material the fluidity of cast iron. Also the strength properties, due to the ferritic-carbitic structure, very closely resemble those of a good special cast iron. Higher carbon contents are used particularly in thin-walled castings such as needlepoint recuperators or in parts which are subject to strong abrasive attack, such as the rabbles of Hereshoff's furnaces.

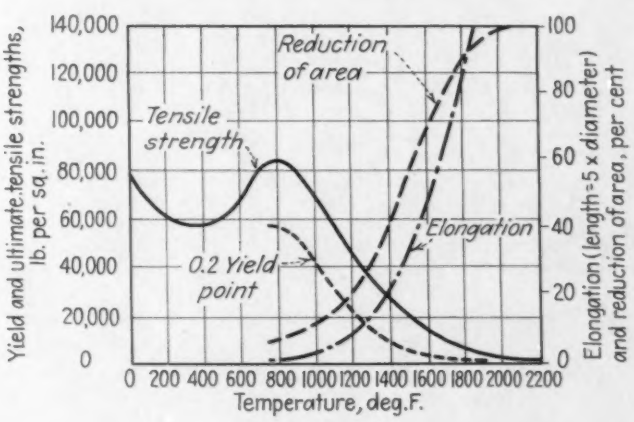



FIG. 3—Results of tensile tests at elevated temperatures for a steel casting with 30 Cr.

Not only for economy, but also for attaining greater toughness at room temperatures, the chromium content of cast alloys will probably be chosen as low as possible at the operating temperature. This rule also applies to furnace parts which are built into the unit and not subject to mechanical impact stresses. Owing to the low heat conductivity which is only a third of that of the unalloyed steel at moderate temperatures, considerable heat accumulations can occur during heat or cooling, which lead to considerable mechanical stresses. It is therefore important to make sure that a slow and gradual temperature increase leads into the area of red heat wherever ferritic chromium castings are used. At higher temperatures the material is, however, quite insensitive because the heat conductivity increases noticeably with increase in temperature and also because the toughness of the chromium castings improves with increase in temperature, as shown in Fig. 3. The very material which breaks in the tensile test at room temperature without deformation shows 10 per cent elongation at 650 deg. C. and reaches an elongation of more than 100 per cent at 1830 deg. F.

The temperature of application of a heat resistant steel is determined by the limit of scale resistance. In regard to the steels in Table II which are susceptible to modification, their temperature of transformation is above the temperature of application. This fact is important insofar as the volume changes occurring during the transformation endanger the dimensional stability of the cast parts. Also, a loosening of the protective oxide skin can be caused by the volume changes. Lastly it is possible, because of the low critical rate of cooling of chromium steels, that a hardening effect might take place on rapid cooling from temperatures above the transformation level. This hardening would have a detrimental effect on the toughness of the material.

The well known embrittlement of

LE II
Chromium Steel Casting Alloys

| Creep Strength*, Lb. Per Sq. In. at Deg. F. | | | | | | Scale Resistance in Air | | Mean Coefficient of Expansion Between 68 and 1470 deg. F. (0.001 mm. per m. per deg. C) | Specific Gravity |
|---|---|---|---|---|---|---|---|---|---|
| 1110 | 1290 | 1470 | 1650 | 1832 | 2010 | Permanent Service, Deg. F. | Maximum Temperature, Deg. F. | | |
| 5000 | 1100 | ... | ... | .. | .. | 1290 | 1380 | 15.2 | 7.7 |
| 5000 | 1100 | 430 | ... | .. | .. | 1470 | 1560 | 14.6 | 7.6 |
| 5000 | 1100 | 430 | 170 | .. | .. | 1650 | 1740 | 14.4 | 7.5 |
| 5000 | 1100 | 430 | 170 | 70 | .. | 1830 | 2010 | 14.3 | 7.5 |
| 5000 | 1100 | 430 | 170 | 70 | 40 | 2190 | 2245 | 14.0 | 7.5 |

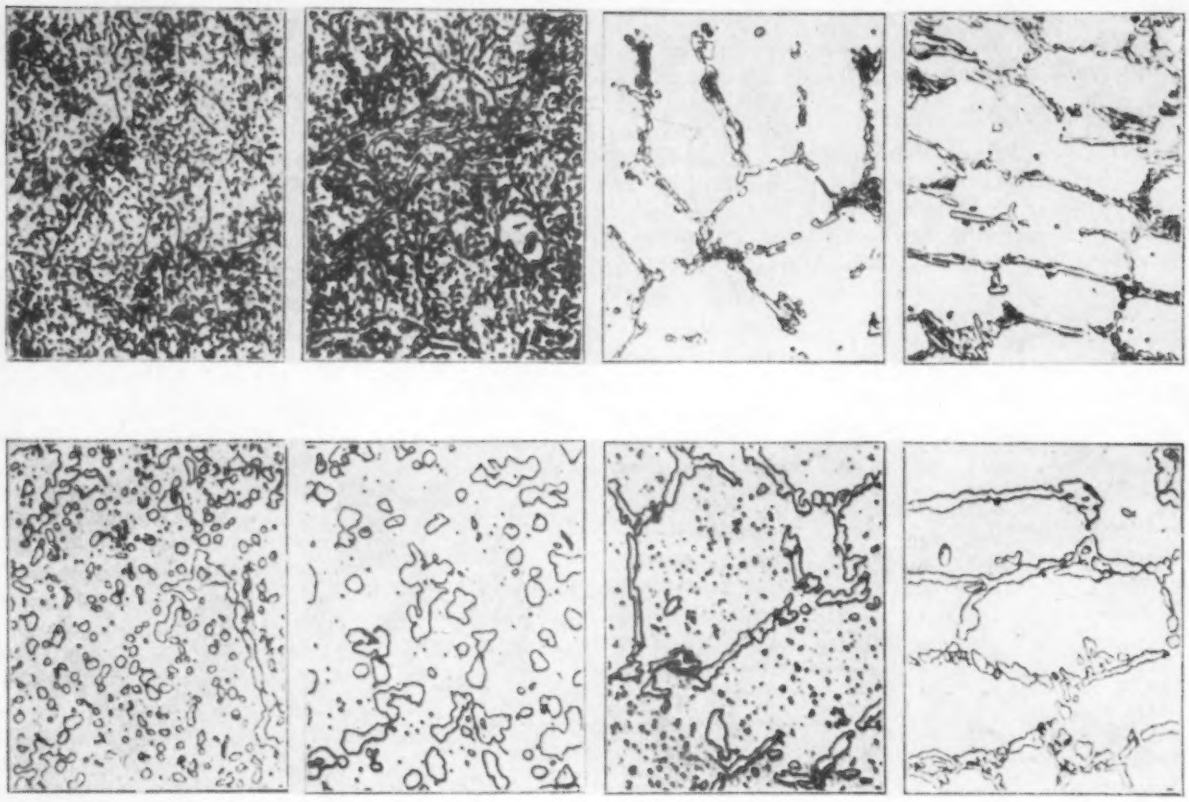


Fig. 4—Contains 14.00 Cr. Fig. 5—Contains 19.00 Cr. Fig. 6—Contains 25.00 Cr. Fig. 7—Contains 30.00 Cr.
Fig. 8—Contains 14.00 Cr. Fig. 9—Contains 19.00 Cr. Fig. 10—Contains 25.00 Cr. Fig. 11—Contains 30.00 Cr.

FIGS. 4 to 11—The influence of a long term anneal (1000 hr. at 1650 deg. F.) on the grain size of chromium steel castings. The top row of photomicrographs (Figs. 4 to 7) shows the as-cast condition, while the bottom row (Figs. 8 to 11) shows the corresponding annealed castings. (Etched in 50 per cent concentrated HCl with 5 per cent concentrated $H_2SO_4$. Figs. 4, 5, 8 and 9 were originally enlarged 500 diameters; Figs. 6, 7, 10 and 11, 200 diameters.

hot worked ferritic chromium steels at 930 deg. F. (Reidreich, G., and F. Loib, *Arch. Eisenhuttenw*, 1941-42, pp. 157 to 182; Bandel, G., and W. Tofaute, *Arch. Eisenhuttenw.* 1941-42, pp. 307 to 320) also occurs in the ferritic carbitic chromium castings. However, chromium castings with more than 25 per cent chromium are rarely used at low temperatures, and will not exert any harmful influence, especially as in cast parts of a greater wall thickness cracks cannot form as readily as in the thin-walled parts made from heat resisting sheet. By a rapid cooling after a short anneal at 1435 to 1510 deg. F. the 930 deg. embrittlement can be removed. The danger of embrittling by coarsening the grain at temperatures above 1740 deg. F. is much less in the ferritic carbitic chromium castings than in the ferritic low carbon chromium steels, since the coarse mesh-type carbide inclusions offer considerable resistance to grain growth.

Figs. 4 to 11 show the structure of scale resisting chromium steel castings both as-cast and after a 1000-hr. anneal at 1650 deg. F. While the steel castings with 14 and 19 per cent chromium show a fine ferritic structure in the as-cast condition, the long term anneal has caused a coagulation of the carbides and a noticeable increase in toughness. Also the castings with 25 and 30 per cent chromium indicate a reformation of the carbides, but on the whole the mesh system has been preserved and the mesh width retained. The investigation of the structure of a casting with 30 per cent chromium after 500 hr. at 1830 deg. F. also showed no marked change in the size of the mesh as compared with the as-cast condition.

*Ed. Note: In the concluding section of this article next week, attention is directed to chrome-nickel steel castings, their casting characteristics and their applications.*

## Testing Wall Thickness of Intricate Castings

IN the direct-current method of testing the thickness of a casting wall from one side only, current is passed through the wall from two contacts. The potential drop caused by the flow of current, which is a measure of the wall thickness, is indicated on a galvanometer connected to two closely adjacent contacts. In the British *Engineering* for May a method is described by B. M. Thornton for testing the walls of small intricate castings where it is difficult to make four suitable contacts in confined spaces. In this method the galvanometer contacts are not close to the contacts for the supply of current. In the case of a gasoline engine cylinder block, the connections to the direct current battery are made at each end of the block and the potential measuring contacts are made at the positions it is desired to test. Potential readings are first taken on a casting known to be sound, the contacts being located by templates. These templates are used on all the duplicate castings it is desired to test and any difference in the readings from those at the same position on the master casting indicates a difference in thickness or a flaw.

# Phosphate Coatings Aid Metal Drawing . .

***. . . The application of phosphate coatings reduces required drawing pressure and tool and die wear, and intermediate annealing is no longer necessary. This German process also claims to make possible the use of low fat-content emulsions for lubricating the work in the draw.***

THE essential principle in the use of any lubricant to reduce friction between the drawing die and the blank is the interposition between two identical or similar metallic surfaces of a parting layer inhibiting the strain corrosion which is fundamentally due to atomic attraction, according to a German article translated in *Sheet Metal Industries*, London.

The most important parting layers of this kind are liquid films, vegetable, animal and mineral oils, greases and soaps, the effect of which can often be increased by the presence of suitable solid coatings. The latter (limewash, metallic oxides, copper and lead) act by retaining the liquid film on the metallic surface by adsorption and preserving the continuity of the parting layer even where the lubricant film is interrupted owing to excessive pressure. Furthermore, such coatings, if sufficiently adhesive and ductile, are capable of counteracting, wholly or partially, the turbulent deformation taking place in the outermost layer of the blank during drawing[1] which again tends to reduce the necessary drawing pressure and protect the surface finish of the work. The favorable influence of the coating will therefore be increased by its firm adhesion to the foundation, and ducility.

Special experiments have been accordingly made by the authors (A. Durer, et al.) to study the action and behavior of phosphate coatings in cold drawing.

## Structure of the Coating

Phosphatic coatings consist of insoluble mixed iron-zinc or iron-manganese phosphates. Coatings deposited in zinc phosphate baths consist principally of tertiary zinc phosphate, while manganese phosphate baths produce deposits of ditrimanganese-phosphate. Interference in the coatings corresponds to the interference of the original pure substances $Zn_3(PO_4)_2\ 4H_2O$ and $Mn_3\ (PO_4)_2$, $2MnHPO_4 \cdot 5\frac{1}{2}H_2O$. Tertiary zinc phosphate can contain some iron in solid solution. The equal radii of the bivalent zinc and iron ions indicate the possible presence of substituted mixed crystals.

No relationship could be detected by radiography between the crystalline orientation of the final phosphate coating and either the orientation of the foundation metal or of the surface of growth. Irregular orientation of the coating is produced both on polycrystalline and monocrystalline iron surfaces.

The structure of such phosphate coatings is considerably influenced by the conditions of formation as the composition of the bath, the condition of the surface, and temperature, which govern the development of the nuclei and the rate of growth. Lamellar, acicular and granular crystals have all been observed. One of the radiograms shows deliberately produced coarsely-granular phosphatic crystals interspersed with patches of bare metal.

The grain size is 1 to 2$\mu$ in the most finely granular phosphate coatings up to 100$\mu$ for the largest crystals. Fine grained phosphate coatings appear to be the most suitable for cold drawing; coarse grained coatings composed of lamellar and acicular crystals have less effect, probably because the lamellar crystals adhere to the foundation on one edge, and the coating is consequently extensively fissured. The thickness of a phosphate coating is usually 1 to 15$\mu$.

After this summary survey of the structure of phosphate coatings, their particular properties aiding the cold drawing process will be discussed.

The oil adsorption capacity was tested on samples of deep drawing steel of approximately similar surface structure, of 0.3 mm. thickness and 60 by 86 mm. area. The samples were degreased and wetted with P.5 spindle oil, in the original condition, and after bonderized for ¼ min. with No. 2 solution. The samples were either dipped 5 mm. in the oil and allowed to soak to capacity, taking about 72 hr. or completely immersed for 3 hr., or subjected to a combination of these two processes. The excess oil was allowed to drain, the samples being suspended by one corner for about 1½ hr., and the last remaining surplus oil carefully removed with filter paper. All three methods of oiling had the same result: The phosphate coated surface retained about double the amount of oil (0.23 mg. per sq. cm.) than the bare surface (0.10 mg. per sq. cm.). Phosphate coatings, therefore, fulfill at least one of the conditions favoring cold drawing. One of the reasons is, of course, the greater superficial area of the coated surface; it is yet uncertain whether the greater adsorption is due to the presence of the phosphate.

## Increasing Oil Adsorption

Somewhat remarkable results were obtained in tests for increasing oil adsorption by increasing the thickness of the coating, in which a number of samples were treated for varying periods in batches of nine for between ¼ and 15 min. The increase in weight owing to phosphate coating was determined, and the increase in thickness measured at five points by means of a Zeiss optimeter.

After again degreasing, the samples were oiled and the degree of adsorption determined by weighing, the results being plotted. The unit values were those for ¼ min. treatment (increase in thickness 9.5$\mu$, increase in weight 0.24 mg. per sq. cm., oil adsorption 0.23 mg. per sq. cm.). Although the thickness, and consequently the weight of the phosphate coating increased approximately four times with increase of the time of

treatment from ¼ to 15 min., the amount of oil adsorption remained almost the same, even decreasing somewhat at first, and increasing after 15 min. treatment by only 20 per cent.

The result is particularly noteworthy, since the density of the phosphate coating remains constant with growth, as proved by the agreement between the growth of thickness and weight (even though the figures actually omitted the amount of iron passing into solution). The rectilinear development of the weight and thickness variations against the square root of the time of treatment can be explained by the diffusion phenomena controlling the growth of the coating, which follow a time-development after $\sqrt{t}$.[2]

The tests show that increasing the thickness of the phosphate coating has no effect on the capacity for oil adsorption; instead of being held in capillaries over the whole surface of the coating, the oil is probably in greater part simply retained by adhesion on the roughened surface. This assumption is upheld by the following test: An oil droplet of about 0.2 mm. diameter placed on the surface of a phosphate coating spreads rapidly to a large spot and thence grows very slowly and to an inconsiderable extent. The change in the microcrystalline reflexion under the stereomicroscope proves that the angular interstices between the crystals have become filled with oil. This aspect is maintained even over long periods of observation, indicating that the oil has not penetrated farther into capillaries.

## Ductility of the Coating

The efficiency of a solid coating in parting the work from the tool during successive deformations depends essentially on its ductility; and the latter condition implies that the coating shall adhere firmly to the foundation and not be subject to brittle fracture.

No data on the ductility of metallic phosphates appear to be available. The practicability of "floating off" phosphate coatings on metals,[3] affords a suitable opportunity of examining the ductility and capacity for deformation of such coatings. Appropriate tests show that the crystals of the phosphate coating are considerably stretched in the drawing process, while in the usual rupture test on phosphate-coated samples the coating shows a brittle fracture, as might be expected from the crystals of salts. The pressure and temperature conditions in the draw are therefore decisive for the ductility of the coating.

These observations show that phosphate coatings are brittle under ordinary conditions of test, but capable of developing the ductility and deformability necessary for a parting layer separating the tool and the work, under the conditions obtaining in the draw.

Direct proof of the value of a phosphate coating as an efficient parting layer has been obtained by laboratory tests with phosphate-coated steel tubes drawn dry under the most severe and practically exceptional conditions. Results for dry pickled tubes, which would be necessary to prove the effectiveness of dry phosphate coatings as a parting layer, was impossible owing to the immediate appearance of strain corrosion when drawing dry pickled tubes.

The plastic deformation of phosphate coatings in drawing is shown also by the change in the appearance of the tube surface with progressive working; the original phosphatized surface is dull and unpolished, but with progressive drawing assumes an increasingly bright finish, becoming clear and translucent. After working, therefore, the coating has no capillaries capable of being filled with lubricant. The foundation metal visible through the coating at first shows the surface roughness remaining from the chemical treatment, the appearance being somewhat similar to that of a ground-glass screen viewed from the back. As the phosphate coating becomes progressively smoother in the course of drawing, the surface of the foundation metal is likewise smoothed, and the tube assumes a metallic luster.

Radiographic examination has not yet disclosed any orderly structure in the deformed phosphate coating.

To determine whether phosphate coatings reduce turbulent deformation in the outer layer of the work, comparative Debye-Scherrer photographs were taken with oblique incidence of the primary ray. Phosphate coated, plain, and pickled tubes were inspected after etching, on the original surfaces and after machining down in small stages. However, the mandrel drawn tubes used proved unsuitable for the purpose, owing to the irregular deformation on both sides of the work.

After describing the technically important, beneficial effect of phosphate coatings in the cold drawing of metals, the underlying reasons for this action of solid parting layers were investigated. The fundamental factors assuring efficient action of the parting layer are defined as: Adhesion, oil adsorption and ductility. Tests on phosphatized steel samples show that the coating has a higher capacity for oil adsorption than a bare, pickled steel surface, and is capable of plastic deformation if firmly adhering to the foundation, under the conditions obtaining in the draw. This behavior appears to explain the beneficial action of phosphate coatings in the cold-drawing of metals.

## References

[1]Bibliography in: G. Wassermann: "Texturen metallischer Werkstoffe." (The Textures of Metallic Engineering Materials.) Pub. Berlin, 1939.

[2] See U. R. Evans (transl. E. Pietsch): "Corrosion, Passivity and Surface Protection of Metals." Pub. Berlin, 1939.

[3] The "floating-off" process was suggested by U. R. Evans (*J. Chem. Soc.*, 1927, p. 1024), for the detachment of oxide films. The process is founded on the affinity of iodine for the boundary layer between the foundation metal and the surface coating, causing the latter to become detached and capable of being floated off. For this purpose, the coating is scratched in several places to lay bare the foundation metal, and immersed for as long as 24 hr. in a saturated solution of iodine in 10 per cent, potassium iodide solution. The sample should be completely submerged and the bath quite full, since air bubbles may cause hydrolysis of ferric iodide with the deposition of contaminating films and flakes of ferric hydroxide. The iodine solution is then drawn off by suction and gradually displaced by distilled water in repeated washings. Small flakes of the coating begin to float off already at this stage, but further separation must be assisted by violently agitating the sample in the washing water. Thin films usually have adhering particles of iron or iron oxide, which can be recognized by their color or by their greater light absorption.

For microscopic examination a fragment of the coating is taken up by a glass spatula and placed in a drop of water on a microscopic slide; the excess of water is taken up by filter paper and the specimen sealed with a cover glass while still moist. Specimens are better examined while moist, since the structure is more clearly distinguishable in aqueous immersion.

# Electric Arc Unit Speeds Stud Welding

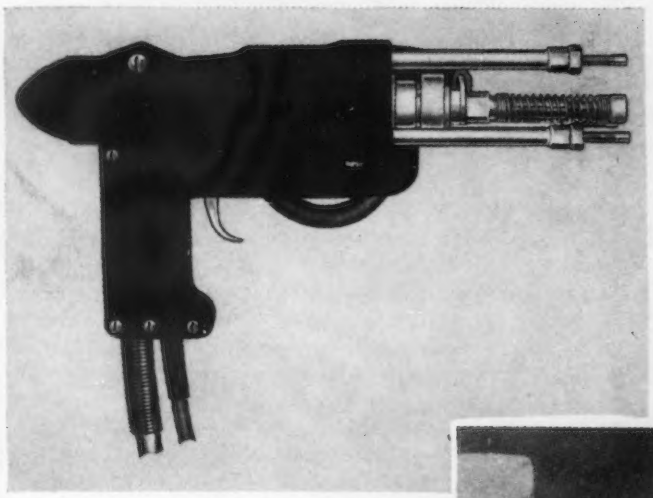


FIG. 1—Stud welding gun equipped with tripod leg arrangement used for welding studs directly to steel surfaces.

A PORTABLE electric arc welder for end welding steel studs to metal surfaces is reported by one shipyard to have increased the output of stud pads from 40 to as high as 1000 per 8-hr. shift. This welding unit, developed by Nelson Speciality Welding Equipment Corp., San Leandro, Calif., is entirely automatic in operation and permits even a newly trained worker to complete 500 to 1000 welds daily.

The complete unit consists of a portable gun, Fig. 1, weighing 7 lb. and a contactor or control cabinet weighing 78 lb. To use the device, the operator loads the gun by placing a stud in the holder. He then cocks the gun, places it in the proper position for welding the stud and pulls the trigger. After the trigger is pulled, the operation is entirely automatic.

The automatic cycle following the pulling of the trigger involves the application of welding current, retracting the stud by means of a spring to create an arc and finally forcing the stud end into the molten weld metal. The control of this cycle is through the control cabinet, shown in Fig. 2. The unit makes use of 400 amp. d.c. for welding, in conjunction with an a.c. timer. The stud is loaded into the center spring wound tube shown in Fig. 1. While in this holder, the stud is surrounded by a porcelain ferrule to shield and protect the arc.

Studs for use with this unit are available in a wide variety of shapes and forms, including flux filled all-position welding studs. The guns are also available in several types, with one, two or three legs. The gun illustrated in Fig. 1 is fitted with three legs. These legs are adjustable to provide the proper position of the stud over the metal surface to which it is to be welded. The gun may also be adapted for securing wood or soft, spongy insulation material like Fiberglas, Fig. 3, to steel plate.

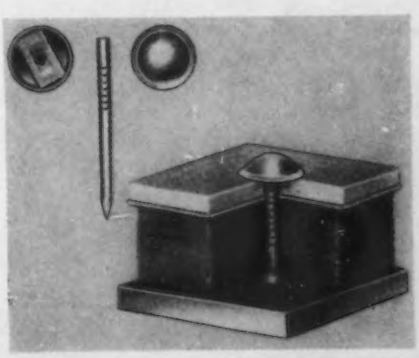
FIG. 2—Method of using gun for attaching various types of studs. The 78-lb. contactor cabinet is shown at the lower right.

This stud welding method is finding wide use in shipyards particularly, since each Liberty ship requires some 25,000 stud welds. It is replacing the older method of welding pads and bolts. In addition to this application, the gun may also be used in securing furniture treadplates and all types of insulating material in mounting manhole covers, fastening hangers for pipe, securing electric light fixtures and switch boxes, to name a few.

The technique for securing wood decking to a steel plate requires these steps: A section of wood plate is fitted and wedged into place. Holes are drilled and counterbored to the desired depth, after which the steel plate is cleaned of all paint, rust and zinc by working through the hole in the planking. The stud is then welded through the hole in the wood decking to the steel plate. A lampwick grommet and a cadmium plated washer are placed on the stud, through the hole in the wood decking and then a slotted nut is applied. This is tightened and a wooden plug is driven into the counterbored hole to complete the job.

Pins used for securing insulation material (Fig. 3) vary in length from 0.75 to 6 in., depending upon the thickness of the material to be fastened. The end of the pin is pointed and will pierce through paint, rust and scale to make contact with the steel plate. The weld is made with the insulation material in place against the bulkhead. The arc burns for approximately 0.1 of a second.

FIG. 3—Small diameter Nelson shielded, self-locking speed clip, welding wire and a sectional cutaway view of insulation material being attached to steel plate. The top sheet is asbestos and the lower material Fiberglas or similar soft insulation.

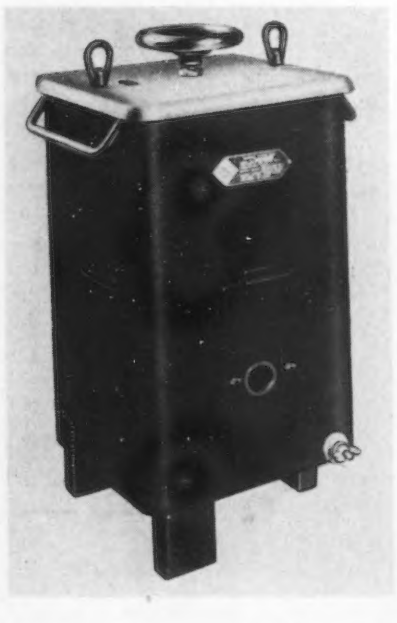


# New Equipment . . .

## Welding

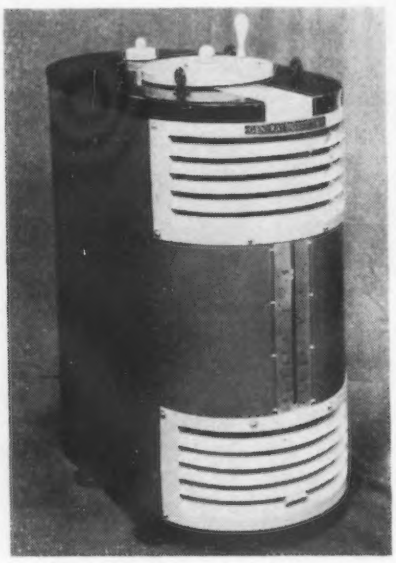
***New developments in a.c. arc welders and electrodes are described, as well as welding positioners, resistance welders and a number of interesting welding accessories.***

A NEW a.c. welder, the Ampac 200, has been announced by the *Allis-Chalmers Mfg. Co.*, Milwaukee. The unit automatically gives the operator correct voltage for the continuous range of currents available, rather than using an almost constant voltage at all current settings. This adjustment makes welding easy at low currents because of the high striking voltage and saves power when welding at high currents because the voltage is low, it is claimed. Other special design and operating features include the integrated reactor-transformer construction, which provides the high yet safe voltage for easy welding at low currents and reactor coils which surround the variable air gap, assuring active duty from every line of flux. Current ranges from 30 to 250 amp. Welders need not be switched for different jobs, because the unit handles rods 1/16 to ¼ in. in size, for thin sheets or heavier plates. Most d.c. rods as well as all a.c. rods can be used, because of the welder's unusual arc stability. The company also offers the Ampac 400, which uses the same basic electric circuit as the 200 machine. It has a current range from 50 to 500 amp. and handles rods up to ⅜ in.



### Outdoor A.C. Welder

A 500-amp. outdoor welder, which has a current range from 100 to 625 volts, has been announced by the *General Electric Co.*, Schenectady. An Idlematic control automatically reduces the output voltage to less than 35 volts whenever the arc is not in operation, but provides full power for welding the instant the arc is struck. A switch operated by a handle extending through the top of the case permits starting or stopping the welder manually. Dripproof construction protects the unit against the entrance of rain, snow and sleet, and a special finish protects internal parts from corrosion.



### A.C. Arc Welders

A LINE of a.c. arc welding machines has been added to the present line of P & H d.c. machines manufactured by *Harnischfeger Corp.*, 4460 West National Avenue, Milwaukee, 14. Built for industrial service, seven types of heavy duty machines and four intermittent duty models are offered. The new units feature WSR (welding service range) ratings which show the actual minimum to maximum output of usable welding current. Specific WSR ratings of the heavy duty models are 29 to 270, 60 to 375, 90 to 500, 100 to 625, 125 to 750, 150 to 900 and 200 to 1200 amp. Ratings of the intermittent duty models are 20 to 185, 20 to 235, 20 to 285 and 20 to 335 amp. Settings and control of current throughout the welding service range are provided through one simple adjustment. The new a.c. models are said to be creep-proof.

### A.C. Welding Transformers

A LINE of heavy duty, a.c. welding transformers in sizes 300, 400, 500, 800, 1000 and 1200 amp. is offered by *Larkin Lectro Products Co.*, 220 Taaffe Place, Brooklyn, N. Y. They are available for 220, 440 and 550 volts for single, dual and multi-operation. An exclusively designed transformer construction is featured, as well as built-in capacitors for power-factor correction, if so de-

sired. The continuous "Glide-Control" adjusts the amperage, with the front of the case containing a small calibrated scale. The 300 and 400 amp. models are portable, and the models from 500 to 1200 amps. are equipped with eye-bolts imbedded in the castings for lifting the machines by crane.

### Welding Calibration Plate

WITH its design taking into account the three electrode groupings according to low, medium and high voltage requirements, a d.c. welder calibration plate, claimed to give exactly the right heat across the arc for each electrode, has been announced by *Harnischfeger Corp.*, 4460 West National Avenue, Milwaukee, 14. Named the Visi-Matic, it provides for all variables of amperage and voltage coincident to

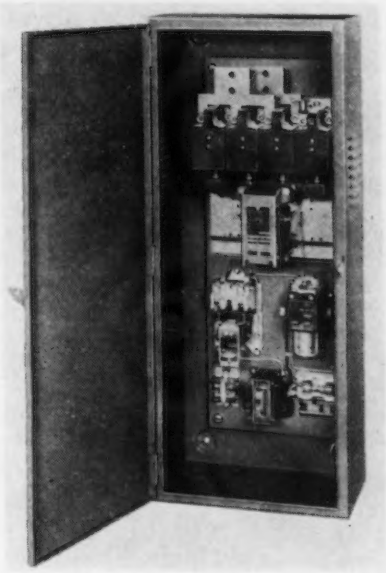
using today's wide range of coated electrodes. By use of a single current control, it reduces proper selection of welding current to the simplest form. Calibrated in amperes, the plate can be used with any make of electrode. Compensation for variations in voltage with the amount of current or amperes, as required by variations in electrode coatings, is attained by turning the one current indicator to the amperage setting desired in either the low, medium or high voltage band. Individual color bands are used to designate the voltage ranges.

### Welding Positioner

DESIGNED to handle loads up to 500 lb. with the center of gravity of load 6 in. away from the table top and with a 6 in. eccentricity, the welding positioner introduced by the *Ransome Machinery Co.*, Dunellen, N. J., is available in hand or motor operated models. The motorized unit includes a Reeves variable speed drive, providing a speed range of up to 1 r.p.m. of the table top. The 26-in. diameter circular table top is T-slotted, and all gears are of the cut-tooth type. A clutch arrangement permits free rotation of the table top by hand when required. The unit can be furnished with a regular base for bench work or with a sub-base giving a height adjustment from 27 up to 42 in.

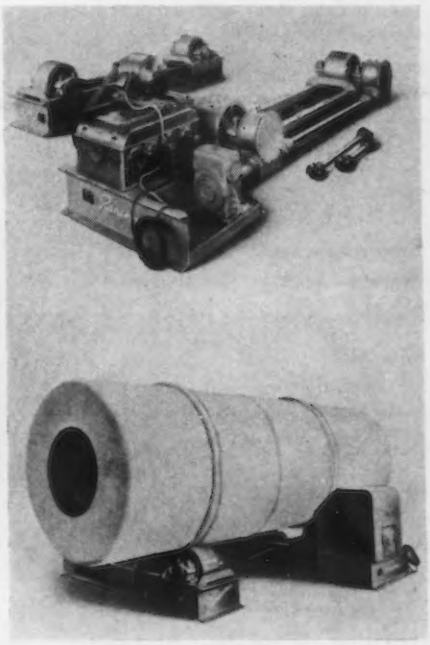
### Arc Welder Safety Control

THE safety panels announced by the *Square D Co.*, 4041 North Richards Street, Milwaukee, are said to eliminate the hazard created by high open circuit voltages of transformer type a.c. arc welders by automatically disconnecting the welder transformer after the arc is broken. The transformer is automatically reconnected when the operator touches the electrode to the work. The primary circuit is connected to the power line only while the arc is held. The panels can be used with any make or model of a.c. transformer type arc welder.



### Turning Rolls

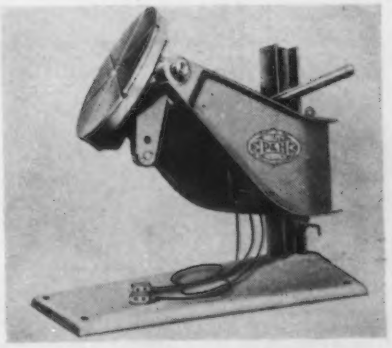
FOR position-welding long drums, tanks and other heavy cylindrical pieces, the *Ransome Machinery Co.*, Dunellen, N. J., offers a turning roll set which consists of a pair of motor-driven rolls controlled through



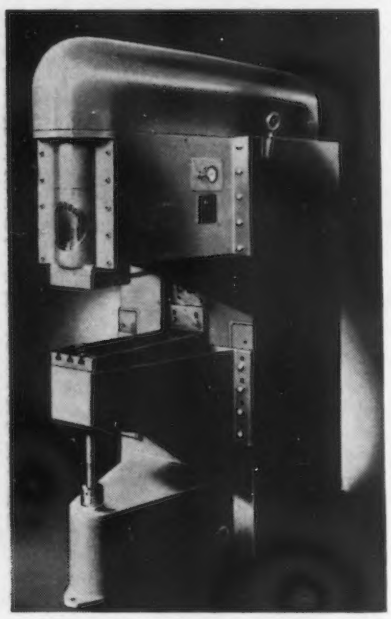
a Reeves variable-speed unit, giving a range of speeds to meet individual job requirements. Remote push button control for forward or reverse rotation and means for changing the center-to-center distance of the rollers, for handling work from 2 to 14 ft. in diameter are furnished. One or more sets of idler rolls are used, according to the length of the cylinder being welded. Units of various capacities are available for handling loads up to 75 tons.

### Welding Positioner

*HARNISCHFEGER CORP.*, 4460 West National Avenue, Milwaukee, 14, is introducing a line of welding positioners made in dual capacities up to 24,000 lb. By placing the elevator column farther back, the design provides greater clearance for handling large weldments. Self-locking worm gear and spindle drive on tilting motion prevents upsets, with limit switch and adjustable stop brackets giving additional safety when extreme tilting is necessary. Table turning is by pinion in totally enclosed gear case to bull gear to



which the table top is securely bolted. Table can be quickly removed for bolting special weldments or fixtures direct to bull gear. Control of table motions is by remote control with individual magnetic pushbutton stations to two separate motors for tilting and turning. A roller equipped yoke with self-locating stops provides free-running elevation of table by hoisting. All models are equipped with a.c. or d.c. and with portable or in-the-floor mounting. Auxiliary equipment available includes self-leveling platform for welding operator, variable speed for table turning and power elevation.

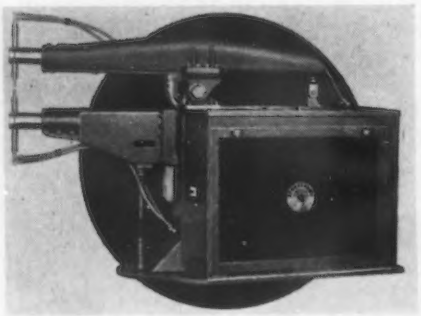


### Press-type Resistance Welder

THE line of "press" or "projection" type resistance welders announced by *Progressive Welding Co.*, 3052 East Outer Drive, Detroit 12, comprises four basic types—light, medium, heavy and extra-heavy duty, each type available in from 4 to 6 kva. capacities and a variety of throat depths. The units are supplied in either air operated or motor driven style, while extra-heavy models are also produced with hydraulic operation. Double cooling water manifolds are fitted in the base of the machine. A series of outlets permit connection of up to six die-cooling circuits to suit specific requirements.

### Rocker Arm Welder

AN improved rocker arm welder designed specifically for condenser-discharge welding of aluminum sheet has been announced by *Progressive Welder Co.*, 3052 East Outer Drive, Detroit 12. It is designed to handle any combination of



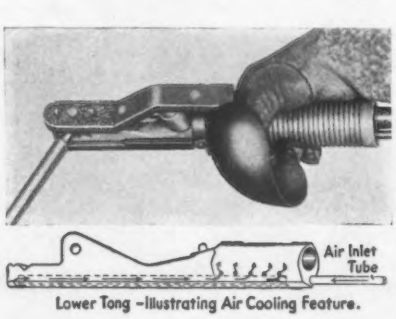
two thicknesses of 24-ST alclad, between 0.016 and 0.081 in. gage at overall production rates of between 1000 and 2000 spots per hr. The throat depth is from 36 to 42 in. and a retractable upper arm permits insertion of flanged work. The lower knee with its arm is vertically adjustable over a range of 10 in. Standard equipment includes solenoid operated valves for controlling the air-operating mechanism, air pressure gages, air regulating valves, air line lubricator and duel shrouded operator's treadle.

### Arc Welding Electrode

THE Tournaweld RW (roller-weld) electrode, specially developed for use in building up track rollers, rails and other similar parts of machines subjected to a combination of impacts and heavy bearing wear, has been announced by *R. G. LeTourneau, Inc.*, Peoria, Ill. The new electrode is characterized by rapid burn-off, smooth operation and uniform deposit of highly alloyed, tough, hard surfacing metal which is sufficiently soft in the as-deposited condition to be ground according to the best practice employed in rebuilding track rollers. It operates with efficiency on reverse polarity with a d.c. welding machine. The rod coating is black in color and comes in diameters of 5/32, 3/16 and ¼ in.

### Electrode Holder

AN air-cooled electrode holder for use on heavy metallic arc welding jobs, such as heavy gage armor plate, is announced by *Jackson Products*, 6231 Wright, Detroit, Mich. The

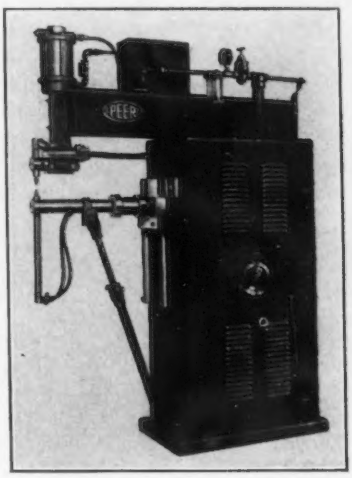



Lower Tong -Illustrating Air Cooling Feature.

insulated heavy duty holder is cooled by air at from 3 to 4 lb. pressure, traveling the entire length of the lower tong. It is introduced by connecting the air inlet tube to the plant air line. It is made of special high conductivity copper alloy, with deep-slotted jaws that grip the rod tightly and hold it at correct angle.

### High Speed Spot Welder

ON the P-20 automatic press type spot welders put on the market by *Pier Equipment Mfg. Co.*, Benton *Harbor, Mich.*, control of pressure,

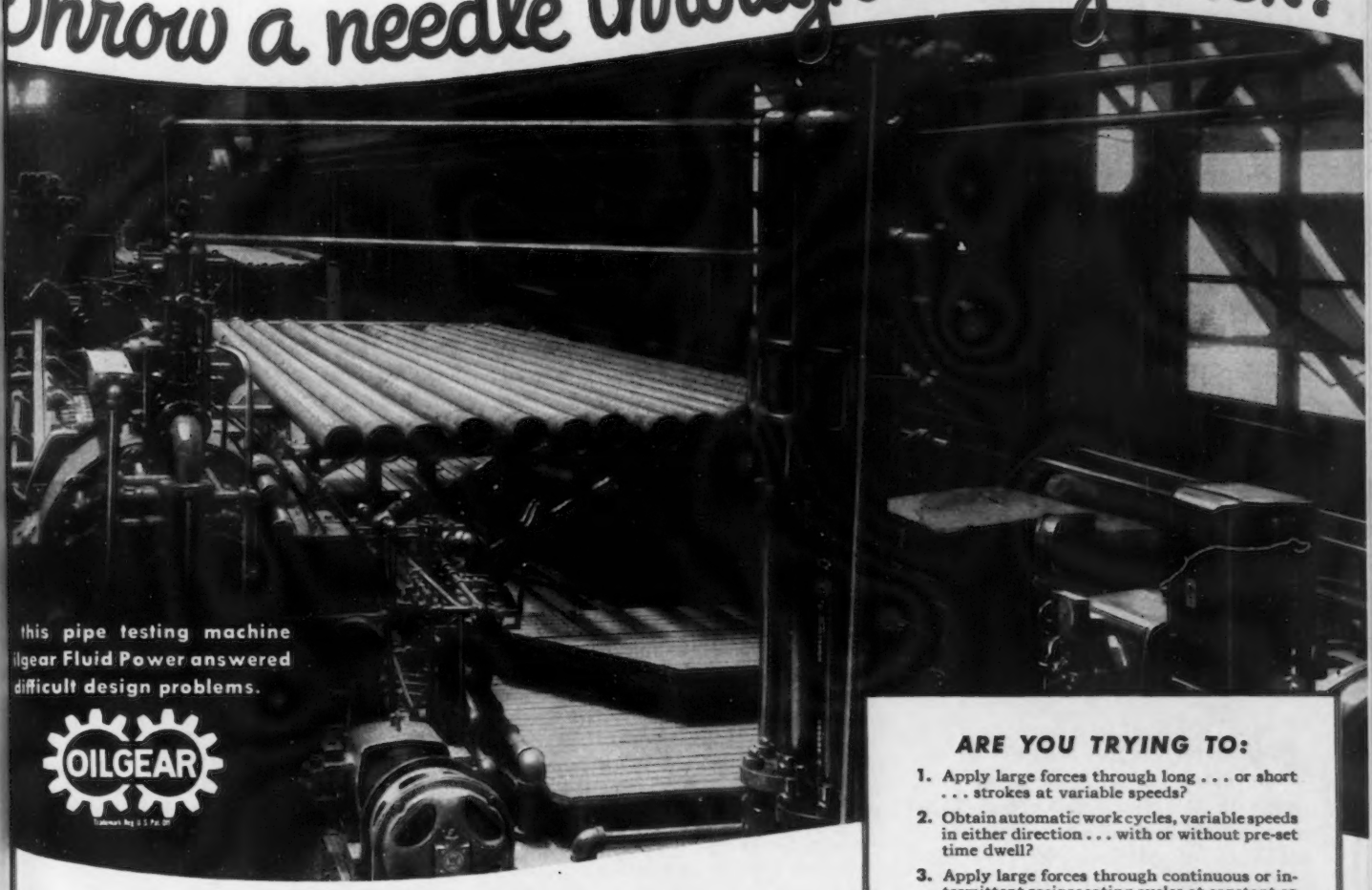


weld time, hold time, off time and speed up to 110 strokes per min. is entirely automatic. The upper electrode is actuated by a double acting air cylinder and electrode pressure range can be adjusted by air pressure regulating valve. Current may be adjusted by the 8-point selector switch. Each of the two capacities made, the 20 and 30 kva., are available in either 12 or 24 in.

### Pressure Reducing Regulator

THE Model 4000-1000 Pilot type pressure reducing regulator, put on the market by *Victor Equipment Co.*, 844 Folsom Street, San Francisco, is available for inlet pressures up to 4000 p.s.i. and for delivery pressures up to 1000 p.s.i. It features a specially designed diaphragm which is gas instead of spring-loaded. The loading pressure of the main regulator is controlled by a built-in pilot regulator, the tension screw of which is so arranged that it will not permit a diaphragm loading pressure beyond a predetermined maximum. To diminish a previously set operating pressure, release of the tension screw of the pilot regulator will exhaust the dome pressure by a non-leak release valve.

# Throw a needle through a Haystack?



this pipe testing machine
ilgear Fluid Power answered
difficult design problems.

OILGEAR

## Oilgear Fluid Power has solved more difficult problems

IT may sound foolish to talk about throwing a needle through anything . . . but Oilgear Fluid Power furnished just the right answer to *that* problem in the design of wire-braiding machines. Oilgear provided a mechanism that could rapidly reciprocate the necessary machine part without it tearing everything to pieces as previous constructions had always done.

*Your* machine design problem may be quite different. You may want steplessly variable speed control of some function . . . or a simple means of applying great pressure . . . or a way of synchronizing a group of motions . . . or a perfect sequence or cycle operation . . . or any one of dozens of Oilgear answers to problems that appear virtually impossible—*until you know Oilgear Fluid Power.*

For a quarter century Oilgear engineers have worked with executives and designers of hundreds of companies building machines and mechanisms of widely diversified use. The combination of Oilgear experience and know-how with the remarkable possibilities inherent in Oilgear Fluid Power equipment may be the very answer to *your* long-sought perfected machine. *Now* is the time to find out. The Oilgear Company, 1303 W. Bruce Street, Milwaukee, Wisconsin.

### ARE YOU TRYING TO:

1. Apply large forces through long . . . or short . . . strokes at variable speeds?
2. Obtain automatic work cycles, variable speeds in either direction . . . with or without pre-set time dwell?
3. Apply large forces through continuous or intermittent reciprocating cycles at constant or variable velocities?
4. Obtain extremely accurate control of either position or speed of a reciprocating member?
5. Apply accurately variable pressure either static or in motion?
6. Closely synchronize various motions, operations or functions?
7. Apply light . . . or heavy . . . forces at extremely high velocities through either long or short distances of travel?
8. Obtain continuous automatic reversing drives at constant R P M or over a wide range of speed variation?
9. Obtain accurate remote control of speed and direction of rotation, rates of acceleration and/or deceleration?
10. Obtain constant horsepower output through all or part of a speed range?
11. Obtain automatic torque control?
12. Obtain accurately matched speed of various rotating elements?
13. Obtain constant speed output from a variable speed input?
14. Obtain full pre-set automatic control, elimination of problems of shock, vibration, etc.?

*You Need Oilgear!*

OILGEAR

Fluid Power

# Assembly Line . . .

STANLEY H. BRAMS

**• Ford decentralizes its purchasing and sales departments . . . President Frazer of Willys resigns . . . Army disposes of big surplus tool stocks far below costs, and thereby stirs up outcry.**

DETROIT—For years the Ford Motor Co. has been one of the most highly centralized concerns in America, undoubtedly the most centralized of the larger ones. Management decisions were concentrated within a small group of top-bracket officials. (An outline of the Ford administration set-up appeared in THE IRON AGE, June 3, 1943, page 70). But evidences of a trend toward decentralization are now beginning to appear, with its first effects apparent in the purchasing and the sales departments.

This trend may be the outgrowth of the increasing emergence of Harry Bennett as a policymaker within the company. Henry Ford has always respected Mr. Bennett's viewpoints, and since the death of Edsel Ford has turned over more and more responsibilities to him.

The decentralization trend, therefore, is somewhat of an anachronism, inasmuch as Mr. Bennett has generally been regarded as an exponent of a tightly knit managerial structure. However, there is no gainsaying the fact that in recent months, while the decentralizing process has gotten under way, Ford people have spoken in terms of increasing respect for Mr. Bennett.

Purchasing, which was once centered in the Administration building at Dearborn, is now spread parallel with Ford's major operations, following the policies of many other automotive companies in this respect, but carrying them further.

As matters now stand, fairly autonomous purchasing divisions function within the Ford Motor Co. at Willow Run, Lincoln, the Pratt & Whitney building and its spreading operations, Highland Park, the "B" building, where vehicular and other production is centered, and at Gate Four, on Miller Road, where small tools, patterns and the like are purchased. Similar purchasing divisions which do their own buying are located wherever else the set-up may be possible and advisable, as, for example, in the case of a branch plant producing goods unique to itself, like the glider operation at Iron Mountain.

In each case, the purchasers at these factory points are working in close conjunction with the operating heads of the various major departments involved. The reasoning behind this is that today's purchasing agent problems are less those of actual buying than those of getting goods to the fabricating point in sufficient quantity and on time. Accordingly, the physical presence of a purchasing organization at the factory operation point is in itself a condition which keeps the flow and supply of materials on level keel.

BRAND-new is the decentralizing of the sales department, which has only now been completed, evidently an initial step in Ford post-war planning. The orthodox system of a sales manager operating through district offices and thence to distributors and dealers is being radically changed. Instead of a central sales office at Dearborn, supervising Ford, Mercury and Lincoln business throughout the country, the program involves the establishment of six regional or zone offices, headed by district sales managers, who will report directly to topmost officials at River Rouge. Understanding is that H. C. Doss, sales manager of the company, will take over the southern sales region.

It remains to be seen whether a similar decentralizing system may be set up in the engineering department under Dale Roeder and John J. Wharam, the new heads. There is some talk that Ford is contemplating the turning over of new car design to Briggs Manufacturing Co., as was the case in earlier years, rather than undertake it at Dearborn. But this report is only at the gossip stage at this time.

Administrative changes are taking place in companies other than Ford. Notable this week is the resignation of Joseph W. Frazer from the presidency of Willys-Overland Motors, Inc. No successor has been named, although the board of directors and its chairman, Ward M. Canaday, had the matter under advisement.

Mr. Frazer's resignation was unexpected, in view of his often-expressed viewpoint that Willys logically has bright anticipations for post-war marketing, based on merchandising of a jeep-like vehicle for all-around farm use and general purpose driving. It appears that Willys will continue to hew to this line in its Victory Day planning, despite Mr. Frazer's resignation.

A TEMPEST broke out in Detroit last weekend with the disclosure that the Army Air Forces had disposed of upwards of a million dollars worth of cutting tools for an estimated $75,000, selling great quantities of the stock as scrap, at 40c. a

**SALVAGED CUTTERS: Cutters worn too much for use on production work are recut and adapted for roughing work in the tool room of the Westinghouse East Springfield, Mass., Works. By adapting an end mill to a vertical milling head the die shoe shown was roughed out much faster than with end mills ordinarily used.**

Prompt
Delivery

# Still Shorthanded? DO THIS NOW:

*Analyze* your operations in the categories listed here. Maybe they're not bottlenecks . . . but perhaps they are places where you're inadvertently "hoarding" manpower that you could use better elsewhere. Flexible shaft equipment can do any of these hand jobs . . . and do them *faster* and *better*.

Where you find flexible shaft equipment will help, we strongly recommend Kellerflex . . . Pratt & Whitney-built with the same experience and ability that goes into P&W basic machine tools. Kellerflex is available in many types and sizes, with accessories for every kind of job. P&W engineers will help you select the right equipment. Changeover from hand work to Kellerflex can be managed overnight, freeing workers for other assignments. You'll be surprised what these machines accomplish in women's hands. *And when your war work is done, you'll have capable equipment to give you a flying start on peacetime production.*

*Prompt deliveries.* Consult your nearest Pratt & Whitney branch office, or contact headquarters: Kellerflex Sales Dept., Pratt & Whitney, *Division* Niles-Bement-Pond Company, West Hartford, Conn.

**CHECK YOUR BOTTLENECK:**

- ☐ BURRING
- ☐ DIE FINISHING
- ☐ DRILLING
- ☐ FILING
- ☐ GRINDING
- ☐ LAPPING
- ☐ POLISHING
- ☐ SANDING
- ☐ SNAGGING
- ☐ WIRE BRUSHING

✓ *Give the Job to Kellerflex*

**KELLERFLEX**

pound — thereby, incidentally, possibly violating OPA ceiling prices on scrap into the bargain.

(The existence of this stockpile of tools was reported in THE IRON AGE, July 22, 1943, page 72. It was described at that time as consisting of about half standard tools which were likely to find ready market, and half special tools.)

The history of these tools goes back to about a year ago, when engineering changes developed on aircraft engines being manufactured by Studebaker Corp. The changes eliminated need for many of the tools previously ordered and in stock, many of them in their original cartons.

The stockpile was gradually moved to Detroit and inventory begun on it. A partial catalog was prepared and distributed. Indications were that the stock would value at somewhere between $1,500,000 and $2,000,000, based on original prices to the Army. Policy on distribution provided for sale only under priority, to war goods contractors, at the original prices.

However, sales lagged, despite Army declaration that average costs paid for the tools were less than then-current going quotations. Experienced tool men who saw the stock felt that the prices were higher than they should be, and this was attributed to the fact that when the tools were first ordered they were urgently needed, and their prices consequently included considerable overtime work which went into them.

At any rate, around 50 sales were made which disposed of a comparatively small proportion of the stockpile, which was taking up a good deal of needed warehouse space. At that time, according to the Army Air Forces, opinion was received from WPB in Washington that the stock consisted only of obsolete tools. A letter is said to have been written July 26 by Franz Stone, Washington chief of the WPB Industrial Specialties Branch, tool Division, stating this viewpoint.

On the basis of this letter, the Army Air Forces said, their Washington offices ordered the disposition of the stock on any basis, even as scrap. Subsequently, the rest of the tools were cleared out at 40c. per pound.

AN Army spokesman, discussing the matter, declared that the subject was "highly technical." He said that "the lay public easily might gain the impression that the Army Air Forces have been wasteful and inefficient in this transaction. That has not been the case."

However, the entire situation appears to be that if prices originally paid were higher than going rates, thus preventing redistribution, they could conceivably be defended on the grounds of the urgent need for the tools at the time of purchase. But if those higher prices interfered with resale, they should first have been marked down to competitive levels, it would appear, in an effort to speed disposal.

If half of the stock consisted of standard equipment, as was estimated last summer, there was $500,000 or more in standard tools at original cost piled up in the Air Forces warehouse. Allowing for far greater price inflation than actually existed, there was $300,000 or so in tools at current prices—a sum which might have been easily realized had the AAF and the WPB moved to put the stock into use channels which certainly existed for such standard equipment. That return would have been far away from the actual $75,000 realization.

This seems to be an example of absentee administration of the sort which encourages slipshod handling. There appears ground for questioning whether there actually existed on July 26, when WPB wrote that the tools were obsolete, a complete inventory of the surplus tools on which to base such a conclusion. Some of the stock in question was still arriving by freight in Detroit earlier in July and was only then being unpacked, sorted and catalogued. There is question whether an inventory of the size involved could have been completed in that short space of time.

At any rate, a recommendation was set forth by WPB, and the Air Forces evidently were glad to have it, in order to clear out what probably was considered a nuisance matter. By following the WPB line, the AAF relieved itself from making the decision in the case, but it did not thereby shake off the viewpoint that it might have gone to greater effort, on its own hook, to merchandise the stock on hand.

There raises, too, the question of whether bids should have been sought when it was decided to reduce prices below the levels carried on the inventory.

As money goes, in these days of billion dollar expenditures, the loss accruing from the distress level selling of the tools is not so much. And most of the tools probably still exist, on sale in outlet stores where they may flow into useful channels of production. It can be hoped that any hue and cry which continues over this comparatively small matter will have a cleansing effect on the distribution of other surplus equipment stocks which may exist today and will unquestionably exist in greater measure as new changes come to the war production picture.

### *WPB Answers "Tool-Bargain" Charge*

**• • • A statement by Army Air Force officials that substantial quantity of machine tools had been sold as scrap was answered by John S. Chafee, director of the Machine Tool Division of WPB as follows:**

**"It has been reported that a large quantity of useful cutting tools has been scrapped in Detroit on the authority of Franz T. Stone, Chief of the Industrial Specialties Branch, Tools Division, WPB. Blue prints of a large quantity of special single purpose cutting tools used at Studebaker for an engine, the manufacture of which was discontinued there, were submitted to the Tools Division by the Army Air Forces. After an investigation it was found that these particular tools were not suitable for other use and Mr. Stone recommended to the Army Air Forces that these special single purpose tools be sold for scrap. Mr. Stone's recommendation was limited to these special single purpose tools."**

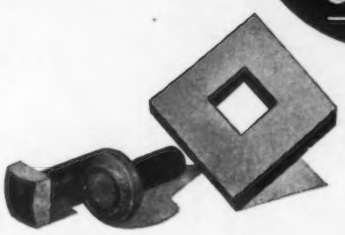
## 2 Ammunition Plants Converted For Synthetic Rubber Program

**• • • Increased efficiency** in the manufacture of small arms ammunition has reached the point where the Ordnance Department, Army Service Forces, has been able to relinquish two ordnance plants to fill another vital war need.

The United States Rubber Co. will replace small arms ammunition production with the manufacture of synthetic rubber tires at the Eau Claire Ordnance Plant, Eau Claire, Wis. The Kelly Springfield Co. is converting the Allegany Ordnance Plant at Cumberland, Md., from the manufacture of small arms to rubber tire production.

Army Ordnance agreed to relinquish these two plants because it is possible for remaining small arms ammunition facilities to expand production as much as necessary to meet current requirements.

# HOW one tool engineer eliminated tool breakage and increased production



◀ *This job required a tool steel with a good combination of hardness and toughness.*

## the tool:

A trimmer die for trimming cold forged blanks for machine bolts and cap screws of SAE 1020.

## the problem:

Excessive breakage resulted when the tools were left hard enough to provide maximum wear resistance. But when the tools were drawn back far enough to eliminate breakage, they required too frequent redressing—resulting in considerable machine shut-down time and lost production. Several types of tool steel were tried, none of which met the requirements of the job.

## the solution:

The Tool Engineer needed a tool steel that had a good combination of hardness and toughness. So using the Carpenter Matched Set Method of selecting tool steel, he found that *Carpenter No. 11 Special* promised to give a good combination of these qualities.

**Carpenter MATCHED TOOL STEELS**

## the results:

With *Carpenter No. 11 Special,* a straight carbon (tough timbre) water-hardening tool steel, these results were obtained.

1. ***Breakage was licked—and production was increased from 7,500 pieces to 86,000 pieces per grind.***
2. ***An increase from 5 hours to 60 hours in production time between grinds.***
3. ***Machine shut-down time of 1 hour and 12 minutes per day was eliminated.***
4. ***Added machine capacity—1,728 pieces per machine per day.***

**This is another example of how the Carpenter Matched Set Method of selecting tool steel has been used successfully. If you would like to know how it can help you get tools that give increased production with fewer interruptions, ask for a copy of the 167-page Carpenter Matched Tool Steel Manual. It contains much useful information to help you select the proper tool steel for practically any type of tool. A note on your company letterhead will start your copy on its way, so drop us a line today.**

***THE CARPENTER STEEL COMPANY***
***121 W. Bern Street • Reading, Penna.***

# Washington . . .

L. W. MOFFETT

**• Disputes arise over which agency shall write rules for contract termination . . . Establishment of new procurement agency may take termination control from all agencies . . . Congress to hold hearings on subject.**

WASHINGTON—Efforts by the war agencies to write rules on contract termination and make them stick are running into a full-scale barrage of opposition.

When it appeared that WPB, the Army and Navy were more or less in agreement on what to do about termination, four other dissidents inserted themselves in the picture. These are reported to be organized labor, the General Accounting Office, certain Congressional factions and the Office of War Mobilization.

There are now those who are trying to make it appear that the whole dispute is to be governed by the outcome of an Army and WPB fight over who should control procurement policy in this regard—Army contracting officers or civilians.

Disputes are said to have reached the point where control over termination may be taken away from all agencies through the creation of a new procurement agency by War Mobilizer James F. Byrnes. This rumor, current in executive departments, implies a typical White House solution calculated to by-pass Congress.

Peculiarly enough, support for civilian control is building up among some Congressional groups favoring WPB procurement domination. Other members want to leave procurement machinery where it is, but want to determine what policies should be followed.

While there is still disagreement over whether workers should be paid dismissal wages when contracts are ended, it is clear that organized labor is powerful enough to get all of the groups to agree to this, finally. Dismissal wages are now a matter of state law and arguments are expected to be made to Congress by employers that the allowance of these wages will be an invasion of state's rights by the federal government.

Organized labor has reasoned that if the government is to provide industry with post-war reserves, it is entitled to dismissal wages. The likelihood that Congress will listen to labor's demand is fairly certain according to competent observers.

While no public announcement has been made by either CIO or AFL, it is understood that these organizations may soon take a stand that present termination rules provide the government with no safeguards against wholesale raids on the Treasury by industry.

Organized labor is expected to say that the discretion granted by the services to contracting officers to delegate authority to contractors to dispose of completed items, work in process, fabricated inventory and other inventory practically guarantees titanic losses to the government.

While this point may have some force, the real reason labor is alarmed is that such sales of "surplus property" without some plan for protecting future manufacture would prevent the resumption of manufacture and the reemployment of workers for a long time.

THE General Accounting Office is exerting pressure on Congress to make provision for GAO review of all settlements made by contracting officers. The Army and Navy have insisted that they cannot do business so rapidly if GAO reviews all their settlements.

Under pre-war procedure, GAO reviewed all contract cancellations to see to it that financial laws were complied with, and the rights of the government were preserved. Some officials allege that the War Department wants to get away from this and is proposing that contracts which are terminated, as soon as the termination clause is inserted, should remain executory.

Obviously, if contracts are arbitrarily made executory as soon as they contain termination clauses, the GAO will have no jurisdiction. Contracting officers will then be free to dispose of plants, machinery and property without outside accounting supervision.

*International News Photo*

**LOST BY A ZERO: An extra gasoline "belly tank" dropped by a Jap zero fighter during a raid on an advanced American air base in China is examined by mechanics. A side of the tank has been ripped away to show its bulky plywood construction.**

On the other hand, the service view is that there are some 250,000 prime contracts and millions of sub-contracts which should be liquidated as speedily as possible. Slow settlement could hold up production and prevent conversion. Conversion and war production would be held up because many contractors would be threatened with insolvency. They just would not have the funds to enter into new contracts.

The chances for different standards creeping into settlements are magnified because under the Army PR 15 the chief of each technical service may prescribe procedures for his service, "consistent with the regulation."

MORE uniformity could be promoted, if written decisions were filed with each case of major importance as a guide to future precedent. Manufacturers then could have some idea of how competitors were

# OUR STORY IN PICTURES LEAVES NOTHING UNTOLD

★ Within fifty-six pages, profusely illustrated is as much of the story of the adaptability, economy and efficiency of overhead handling with AMERICAN MONORAIL EQUIPMENT that can be told without personal consultation.

If you are interested in producing more war material and at the same time preparing for post-war activities, do two things. First, send for American MonoRail Picture Book, see how this equipment is efficiently serving hundreds of handling jobs. Second, send for the American MonoRail Engineer to show you additional advantages to your individual problem. Write for your copy today!

**THE AMERICAN MONORAIL CO.**

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CLEVELAND 7, OHIO

treated and could anticipate how they themselves would fare.

Under the Army's procedure it is discretionary with the contracting officer to decide: The point at which a contract should be terminated; whether a conference should be held with the contractor prior to termination; whether performance of a contract should be suspended.

Contracting officers, or their representatives have authority to approve dispositions of property; settlements with subcontractors; and to pass upon the miscellaneous minor questions which inevitably arise in connection with a termination settlement.

Critics of the Army procedure say that too much unrestrained authority is given to these contracting officers and since no two men are alike in viewpoint there is bound to be lack of uniformity of decision in these matters.

Now influential members of Congress say that it is going to settle all questions raised by the agencies. The House Military Affairs Committee will soon resume hearings on the Army's proposed bill HR 3022. The Senate Committee on Small Business is also going to hold hearings on a proposal made by Senator Murray, Democrat of Montana.

## Cold Metal Firm Answers Patent Suit

***Youngstown, Ohio***

• • • **In an answer filed** in the District Court of the United States recently, the Cold Metal Process Co., and Abram P. Steckel, have denied generally all charges of misconduct by them, or in their behalf, with respect to certain patents, which charges were contained in a civil action of the United States Government against the two defendants, charging harm to public interest. Previous to the instituted government case, Cold Metal had several suits pending against steel companies for the collection of royalties for the use of certain rolling mill equipment, the principles of which have been patented by the defendants. Considerable interest is centered around the Cold Metal case.

The United States Steel Corp. agreed recently to settle its case after the Supreme Court refused to hear a further plea by United States Steel against a U. S. Court of Appeals decision, favoring the Cold Metal Co.

Excerpts from the Cold Metal answer are as follows:

"Answering generally, defendants deny all charges of misconduct by them or in their behalf in respect of Patents '016 and '195 or the proceedings leading up to their grant, and aver that all conduct by them or in their behalf was lawful and proper. They deny that the Patent Office was imposed upon or made any mistake of law or fact in granting the patents but aver, on the contrary, that the Patent Office was seasonably informed of all pertinent facts. They aver that the patents have been held valid by the courts and accorded pioneer rank; that the actual facts were known to and considered by those courts and have been generally publicly known and known to the plaintiff for more than twelve years; that the inventions have been widely licensed at fair and reasonable rates; and that the metal rolling industry and the public generally have greatly benefited thereby.

"All of the facts with regard to the granting of Patent '195 became matters of public record in the Patent Office on the granting of that patent on Oct. 30, 1930, and were known to plaintiff prior to that date; they were again made a matter of public record in 1932 in an infringement suit in the United States District Court for the Western District of Pennsylvania, *The Cold Metal Process Company v. United Engineering & Foundry Company*, 3 F. Supp. 120, wherein United was charged with infringement of Patent '195; and were again made a matter of public record in 1935 in a suit in the United States District Court for the District of New Jersey, *The Cold Process Company v. American Sheet & Tin Plate Company and United States Steel Corporation*, 22 F. Supp. 75, wherein the defendants were charged with infringement of Patents '016 and '195.

"In the *United* case, 3 F. Supp. 120, the District Court held that no fraud had been committed and that the proceedings in the Patent Office did not debar Cold Metal from enforcing Patent '195. United appealed but its appeal was dismissed, 68 F. (2d) 564. United petitioned the Supreme Court of the United States for a writ of certiorari, basing its petition primarily on the proceedings in the Patent Office. That petition was denied, 291 U. S. 675.

"In the *Carnegie-Illinois* case the defendants contended that the proceedings in the Patent Office constituted unclean hands on the part of Cold Metal and deprived Patent '195 of any presumption of validity. Neither of these contentions was accepted either by the District Court, 22 F. Supp. 75, or by the Circuit Court of Appeals, 108 F. (2d) 322. A petition for rehearing based on the same matter was denied by the Circuit Court of Appeals for the Third Circuit. The defendants thereupon petitioned the Supreme Court of the United States for a writ of certiorari, based on the same facts, which petition was denied, 309 U. S. 665, as was a petition for rehearing, 309 U. S. 697."

THE BULL OF THE WOODS — BY J. R. WILLIAMS

THAT'S TH' BIGGEST STRAIN OF BEIN' TH' HEAD OF ANYTHING! TH' ONES WHO CAN'T GET ALONG WITHOUT YOU ARE TOO QUICK WITH TH' PULMOTOR, AN' TH' ONES WHO CAN'T GET ALONG WITH YOU ARE TOO QUICK WITH THE STRETCHER!
YEH--AND IF THEY WAS AS QUICK WITH THEIR WORK, THEY WOULDN'T NEED TO BE SHOP POLITICIANS!
WARNER SWASEY
J.R.WILLIAMS
COPR. 1943 BY NEA SERVICE, INC. T. M. REG. U. S. PAT. OFF.

THE CAT AND MICE

## Seventh Day Bonus Granted General Steel

*Washington*

• • • **The WLB last week** authorized the General Steel Castings Corp., Granite City, Ill., to grant a bonus to employes who work the sixth and seventh day of a work week and who are laid off on any one of the days at the beginning of the week. This authorization, the board said, was granted in compliance with the Illinois One-Day-of-Rest-in-Seven law. The company's approximately 4000 employes are represented by the CIO's United Steelworkers, International Association of Machinists, AFL's International Brotherhood of Boilermakers and the Pattern Makers League of North America.

# HOW TO ORDER SHEFFIELD THREAD ROLL-SNAP GAGES

In ordering Thread ROLL-SNAP Gages be sure to state: 1. Style • 2. Major or outside diameter • 3. Pitch or threads per inch • 4. Pitch diameter of the GO and NOT GO rolls • 5. Complete marking instructions.

Sheffield Thread ROLL-SNAP will be set and sealed before shipment when Setting Plugs are included in the order. Otherwise, Thread ROLL-SNAP Gages will not be set at the factory unless the customer furnishes proper setting gages, except in the cases of standard specifications from No. 4 to 1½", NF-2, NF-3, NC-2 and NC-3. • In all cases, however, the limits will be stamped on the gage marking ring.

*Write for descriptive bulletin No. G662-143*

**THE SHEFFIELD CORPORATION**

SHEFFIELD MASTER CRAFTSMEN

*Dayton 1, Ohio, U.S.A.*

**Style A** for ¼" and larger, for pitches 9 to 32 inclusive and has a GO roll of .350" in length.

**Style B** for ¼" and larger, for pitches 6 to 28 inclusive and has a GO roll of .980" in length.

**Style C** for No. 12 and smaller, for pitches 24 to 56 inclusive and has a GO roll of .250" in length.

**Style D** for ¼" and larger, for pitches 6 to 32 inclusive and has a GO roll of .625" in length.

**Style F** for ¼" and larger, for pitches 6 to 32 inclusive except 5, 10, 13, and 16 has a GO roll of .675" in length.

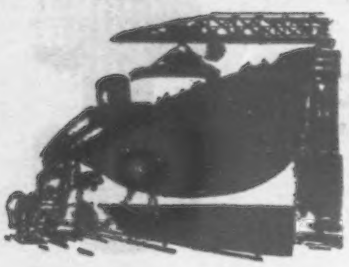
**Style F** for ¼" and larger, for pitches 5, 10, 13, and 16 only has a GO roll of .725" in length.

**Style E** for ¼" and larger, for pitches 7 to 32 inclusive and has a GO roll of .475" in length.

Manufactured Under Patents Nos. 1,660,336; 1,851,283; 1,930,558

# WEST COAST . . . OSGOOD MURDOCK

**• West Coast Manpower Utilization Plan seen for all labor shortage areas . . . Shipbuilding and repair of battle-damaged ships given high labor priority rating.**



SAN FRANCISCO—General application of the West Coast Plan for Manpower Utilization to all labor shortage areas in the United States is planned by the War Manpower Commission. The plan will be adapted and modified to meet the particular circumstances of each shortage area.

A clear outline of the War Manpower Commission's policies was given at several conferences this week by Lawrence A. Appley, executive director of the Commission. Better utilization of the American work force is now the primary means of getting the manpower needed to supply the war plants of the nation, Mr. Appley said. He declared that manufacturers must give the same "careful planning and consideration to the human elements in their plants as they do the production elements."

If full utilization of manpower could be secured, production of the nation's war plants would be increased by 25 per cent, Jack Skelly, assistant director of the WMC's bureau of utilization, estimated. In discussing the bureau's activities Mr. Skelly and other WMC officials discussed certain phases of the manpower problem of vital interest to management:

1. Many employers think that their job is production and the government's job is to supply workers and community facilities. WMC feels that management must accept a responsibility on both scores.

2. The WMC now has 135 consultants in the field and 10 in Washington to help employers get better utilization from their working force.

3. The relative inefficiency of war plants is not a result of deliberate labor hoarding, but is a result rather of lack of knowledge on the part of the employer as to how to use the manpower he has.

4. If large numbers of workers are sent to a plant and a number almost as large quit because of poor working conditions, there is no sense in continuing to refer workers to the plant until the circumstances causing the turnover have been corrected.

5. The efficiency of manpower utilization of war plants today ranges from 100 per cent to as low as 30 per cent.

6. The War Production Board can now ask the War Manpower Commission to study the way a plant is using labor, whereas before the WMC could make the study only at the invitation of the management.

7. Committees to improve the utilization of manpower in the West Coast areas, as part of the West Coast manpower program, will be set up within a month. The procedure will soon be followed in all other labor shortage areas.

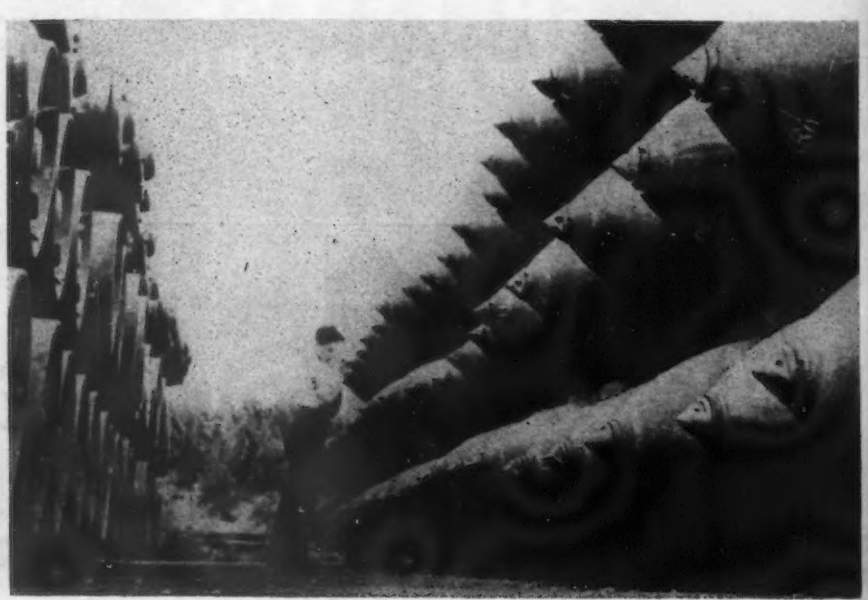
SHIPBUILDING and the repair of battle damaged vessels have been given a high priority in the recruitment of manpower by Paul V. McNutt, chairman of the War Manpower Commission.

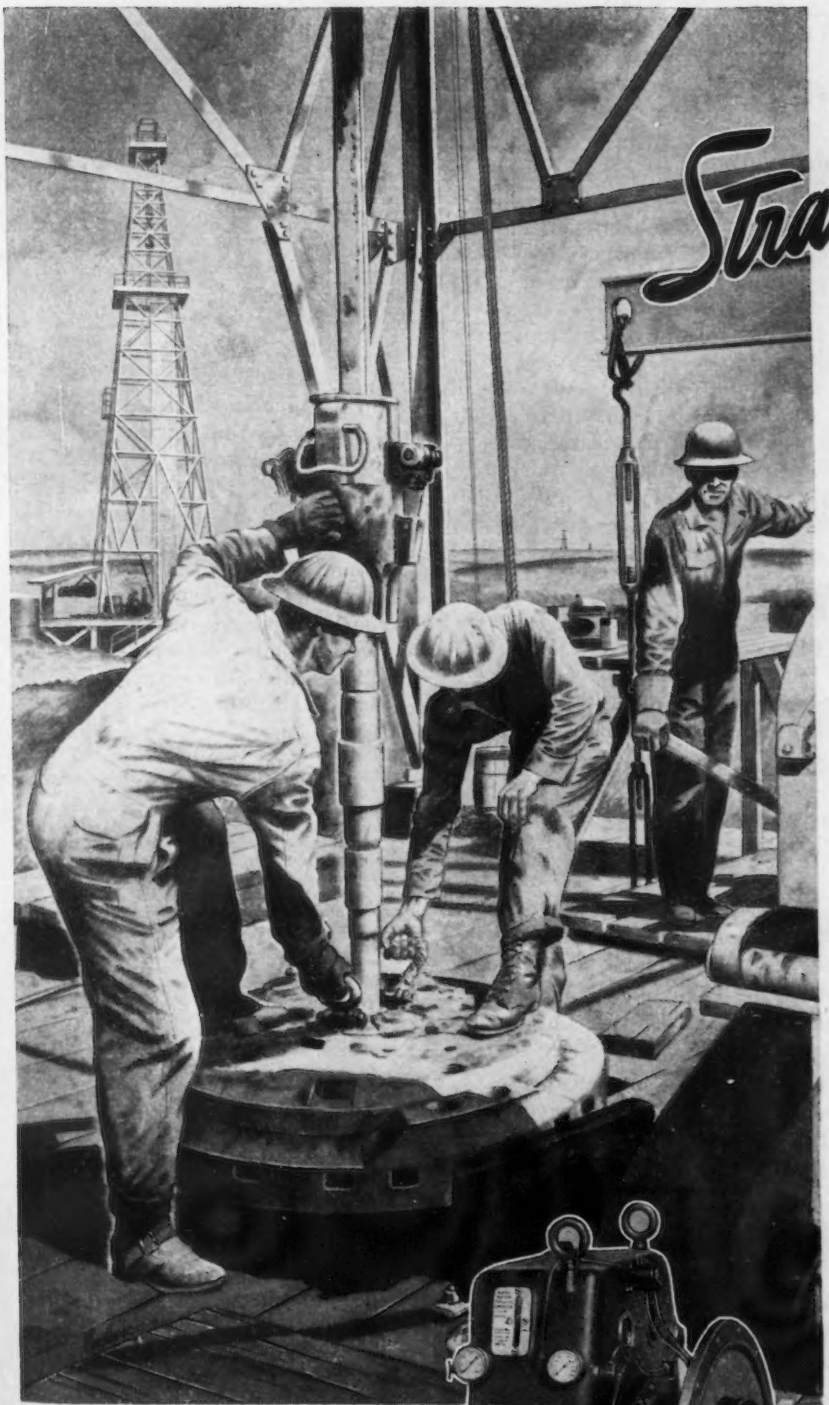
A recruitment campaign for skilled and unskilled labor for the shipyards is being conducted in nine War Manpower Commission regions. The demands of the shipyards along the Pacific and Gulf coasts are especially heavy and urgent and, as a result, it has been necessary to go into communities in almost all sections of the country except where critical labor shortages exist.

Chairman McNutt said, however, that every precaution was being taken to prevent the recruitment campaign from interfering with other essential activities in areas being canvassed for shipyard workers.

Recently, Mr. McNutt pointed out, the War Manpower Commission cancelled all inter-regional clearance orders, numbering many hundred thou-

**NEXT STOP HAMBURG: A ground crew armorer checks the bombs at an air base in England before they are loaded on allied bombers on the Hamburg run.**





# Straight down . . .

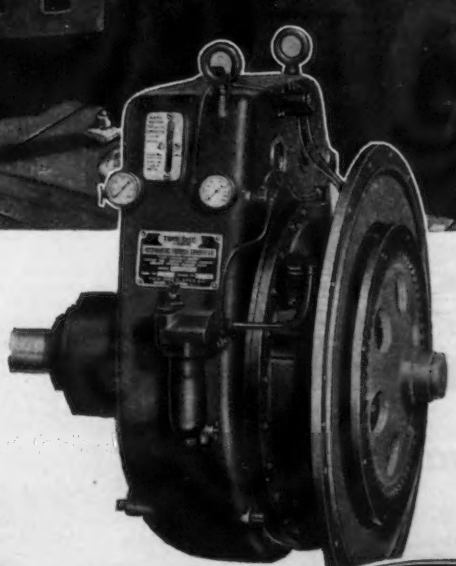
## TO MODERN TIMES

As it turned out, drilling straight down into the earth—for oil—proved the shortest road to modern times. Oil as a power source, fuel, lubricant and base for the manufacture of countless familiar things, becomes increasingly important. Skilled men who make oil available can keep up with our needs only if their mechanical help keeps pace with demands made upon it.

In the oil fields, Twin Disc Clutches and Hydraulic Drives have long transmitted and controlled much of the power operating oil well drilling machinery. Despite the merciless punishment taken by drilling equipment, Twin Disc products have proved their worth repeatedly on the job of getting oil out of the ground. So here again, the Twin Disc Clutch Company's quarter century of experience in designing and building industrial power links makes a direct contribution to keeping living standards at the high level to which petroleum products helped raise them.

Developing power links for oil rigs is just one phase of our activities. If machines you build or buy have both a driven and driving unit, then it's quite likely *you* can benefit by consulting Twin Disc engineers. You are assured of unbiased recommendations—because we build hydraulic drives as well as friction clutches. Make a point of writing us about your problems soon. TWIN DISC CLUTCH COMPANY, Racine, Wisconsin.

*The Twin Disc Hydraulic Torque Converter (Lysholm-Smith Type) eliminates gear-shifting, multiplies an engine's torque. It cushions shock loads, prevents engine stalling or damage, handles heavy loads without jerking.*



sands, and set up a centralized procedure for moving workers from one section of the country to another. Under the new procedure, preference in the movement of workers was given to prospective shipyard workers. The demand was so urgent and so vitally concerned the war program, that it was felt that the needs of the shipyards must be met and at once.

Such recruitment campaigns, however, have been under the close and careful supervision of the local offices of the United States Employment Service. Applicants are "screened" in such a way that proper weight is given the essential needs of local activities before workers are permitted to make contact with hiring officials of shipyards. No applicants engaged in essential activity at their highest skill are referred to out-of-town employers. Also, local employer orders are given priority over all orders from other areas.

"On the whole," said Mr. McNutt, "this has resulted in protecting the labor force of other essential activities."

"The nation-wide character of the campaign will, it is anticipated, prevent too many workers being withdrawn from one area. In June, the total of shipyard workers recruited from non-shipbuilding areas was approximately 6000. The effect of any one industry or activity was minimized by the fact that this number of workers was withdrawn from the entire country. The total, however, has been vitally important to the shipyards. We hope, by keeping the campaign practically nation-wide to prevent hardships in any particular regions."

## Stettinius' Able Service Rewarded

*Washington*

• • • **While a surprise** to the public, the appointment of Edward R. Stettinius, Jr., to the high position of Undersecretary of State was made by the President in recognition of the able service performed by the former chairman of the United States Steel Corp., both as a Government official and as a business man. He succeeds Sumner Welles, whose resignation is reported to have been due to differences with Secretary of State Cordell Hull on this Government's policy with respect to Russia.

Although the newly created Office of Foreign Economic Administration centralizes the activities formerly carried on by the Office of Lend-Lease Administration, Foreign Relief and Rehabilitation Operations and the Office of Economic Warfare under Foreign Economic Administrator Leo Crowley, who was promoted from the post of director of OEW, the powers and functions of the centralized organization are required to conform to the Secretary of State's foreign policy. Thus, outside of operational activities, Lend-Lease and other Government agencies brought together, are subject to the foreign policy of the State Department of which Mr. Stettinius now is next to highest ranking official. However, approval of War Mobilization Commttee must be given and filed with the State Department before the Office of Foreign Economic Administration can procure services, supplies or equipment outside the United States, except for the purpose of executing general economic programs.

## Lincoln Flays Price Adjustment Board

• • • **Actions** of the Price Adjustment Board in Washington threaten to "wreck our present economy" and lengthen the war, stated J. F. Lincoln, president, Lincoln Electric Co., Cleveland, in Washington last week.

Mr. Lincoln made the charge in a letter Sept. 25 to Congressman Robert Doughton, chairman of the Ways and Means Committee. The letter said:

"In accordance with your request made at the hearing before the Ways and Means Committee on Sept. 14, I am reporting to you the result of our conference with the Price Adjustment Board yesterday at 718 18th Street.

"The committee under the chairmanship of Kenneth Rockey without any known supportable reason determined that 64 per cent of our 1942 business was renegotiable. On these sales, after having lauded highly our efficiency and cooperation with the war effort, he allowed us approximately 3 per cent profit. Such penalty means that the company will enter the post-war period unable to meet the reconversion problems.

"This allowed profit is less than one-fifth of that made by our company in 1937, and also less than one-fifth the rate of profit allowed the du Pont Co. by this same board for 1942.

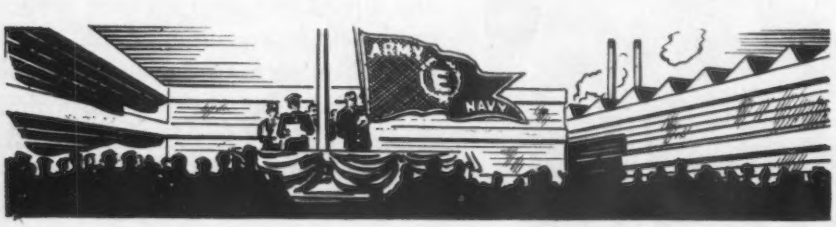
"I was unable by questioning to determine whether this action was prompted by ignorance or vindictiveness because of my criticism of the board at the hearing of Sept. 14, or if it had a still more insidious meaning. As an American citizen I must recommend investigation of this board by the proper governmental agency.

"In any case, when this penalty for efficiency of $3,250,000 is added to that of $1,600,000 assessed by the Treasury Department for the same reason it makes it impossible for us to follow our previous course of outstanding skillful manufacturing mentioned by Chairman Rockey, and still remain a going concern.

"There is no recourse, as you well know, from this procedure.

"Unless these whimsical actions of the Price Adjustment Board are stopped by quick action of Congress, this uncontrolled bureau will not only wreck our present economy but it will also greatly lengthen the war and our casualty lists.

"We have refused to accept this ruling, which Mr. Rockey says is carrying out the intention of the law passed by Congress. The committee has served notice on us that it will proceed to enforce its penalty. We will resist to the end, but alone we are helpless."




## . . . Cited for Awards . . .

• • • **The following companies** have been recently awarded the Army-Navy "E" award for outstanding war production.

**Cutler-Hammer, Inc.,** Milwaukee
**Ferro Enamel Corp.,** Cleveland
**American Steel Package Co.,** Defiance Plant, Defiance, Ohio
**American Viscose Corp.,** Front Royal Plant, Front Royal, Va.
**Associated Foundries & Manufacturers, Inc.,** New York
**Everedy Co., Inc.,** Frederick, Md.
**International Business Machines Corp.,** Plant No. 4, Poughkeepsie, N. Y.
**Intertype Corporation,** Brooklyn, N. Y.
**Raybestos-Manhattan, Inc.,** Manhattan Rubber Mfg. Division, Passaic, N. J., and Raybestos Division, Bridgeport, Conn.
**Rola Co., Inc.,** Cleveland.

*Maritime "M" Awards*

**Jones & Laughlin Steel Corp.,** Pittsburgh Works, Pittsburgh
**Jenkins Bros.,** Bridgeport, Conn. (gold star)

## Hoyt Gets Scrap Post

*Washington*

• • • **H. M. Faust, Director** of the Salvage Division, WPB, has announced the appointment of W. Thomas Hoyt of New York, as deputy director of the division.

Mr. Hoyt has been WPB Salvage Manager in the New York Region.

# QUICKER PRODUCTION from UNSKILLED HELP

## Assured by VICKERS HYDROMOTIVE CONTROLS

The war cannot wait on long training programs . . . workers to fill manpower shortages must be trained quickly so they can turn out needed production at the earliest possible moment.

Machines equipped with Vickers Hydromotive Controls shorten and simplify training. Most of the required skill can be built into the machine. Complex operations can be reduced to simple routines . . . or can be made automatic. Controls can be interlocked so the job can't be done wrong. Overload and tool breakage can be prevented by exact load limitations which are easily applied.

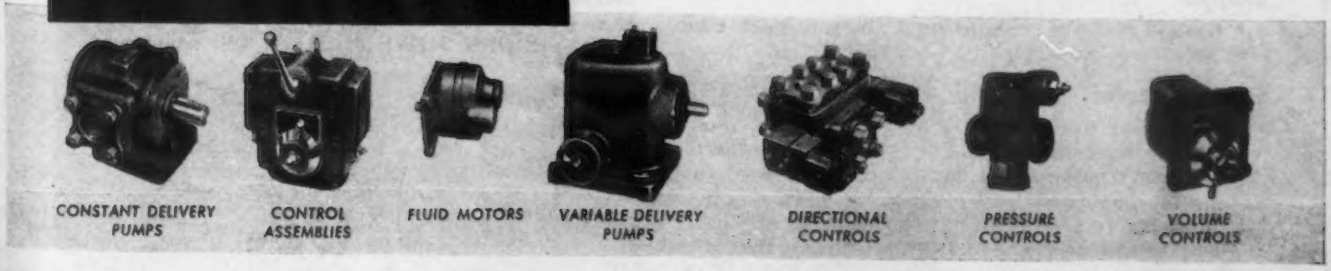
A Vickers Application Engineer will gladly discuss "hydraulics" in connection with your machines.

**Representative of More than 5,000 Standardized Vickers Units for Every Hydraulic Power and Control Function**

VICKERS *Incorporated*

**1420 OAKMAN BLVD. • DETROIT, MICHIGAN**

*Application Engineering Offices:* CHICAGO • CLEVELAND • DETROIT
LOS ANGELES • NEWARK • PHILADELPHIA • ROCKFORD • TULSA • WORCESTER



# Fatigue Cracks

BY A. H. DIX

### Blurbs in Marble

• • • A man who said that he is compiling a roster of business papers' technicolored achievements called us up the other day and asked what we had to throw into the pot.

We told him how, 'way back in the '80s, those who would soften the dollar were routed by a brilliant bombardment conducted by our founder, John (Hard Money, 400 Brinell) Williams; how, years later, in the early '30s, your favorite family journal's present editor (and president), John Herbert Van Deventer, was first to point out that the Technocrats' cannon were only wood, painted to look like steel, thus permitting blood to flow again in captains of industry's extremities.

We told him how, in '41, when industry was doing its initial floundering in the Sargasso Sea of priorities, the world's greatest industrial journal quickly whipped up a chart that attained eight printings and great fame because it offered the surest route to safe port.

At this point our inquirer halted us, reminding us that he must leave room on the monument to carve others' glorious deeds. He hung up before we could suggest that space be left on his marble for a bulletin board on which the current and homelier victories of the technical journals could be recited. As, for instance, this one of a few days ago.

> While making a complicated die, a certain shop here in Manhattan, had the misfortune to have a tap break off short. The superintendent recalled reading in the Sept. 24 issue (page 58) about a way of welding an electrode to the broken tool, fixing a lathe dog to the top of the electrode, tapping it with a hammer, and backing out the tap. He tried it, it worked, saving him much time and hundreds of dollars.

Since speaking with the monument man we have inclined to the belief that the stone should have nothing graven on it and that it would serve best if used wholly as a support for late bulletins, inasmuch as emphasis on past victories often suggests an absence of current achievement.

### Aptronym

• • • J. E. Gallagher says there is a farmer in North Judson, Ind., named Richard Gumz, who raises peppermint. "I got," he adds, "quite a chickle out of it."

### They Had It All the Time

> What's the matter with the singular in the name of the New York Sales Executive Club? How about the AMERICAN GIRL MAGAZINE, the DAILY RUNNING HORSE, and the AMERICAN HORSE AND MULE ASSOCIATION?
>
> —*Deac*

Since commenting on the hiatus created by the absence of the "s" in "Executive Club" we have learned that there is an "s" and therefore no hiatus. Your favorite family journal's v.p. and g.m., informs us that the name is the *Sales Executives Club of New York, Inc.*—complete with plural, which takes the point out of our item and Deac's. Sorry. Anyway, that hive of culture in our home town, Little Falls, N. J. — the Woman's Club—is singular and has dozens of members.

### Stopper

• • • What puts the "oomph" in U. S. wolf-pack hunters?—*National Tube Co.*

### Guest Boaster

• • • You may have noticed that your favorite family journal is practically always first with the news. Even if you haven't noticed, you have at least observed that we miss no opportunity to remind you of it.

It is therefore a relief to have someone pinch hit for us. Our substitute is one of Detroit's largest manufacturers, who compliments Stan Brams, our field editor in the erstwhile automobile center, on a neat bit of trail-blazing, and ends up with:

> Your little family journal is somewhat of a pace-setter for the technical magazine scribes in this area.

### He Left Out a Monster

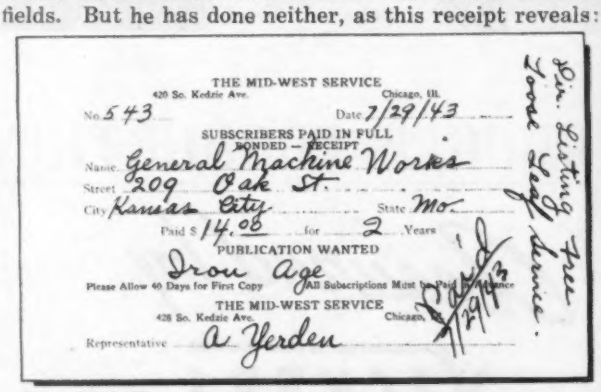
• • • Having exhibited this caress on Stan's back we will now permit I. A. J. Duff, of Woodside, Oakley Green, Windsor, Berks, England, to pat him harder farther down:

> What do you mean by allowing Mr. Brams to say, as he did on page 86 of the June 10 issue, "The 'spontaneous' strike idea of the past winter has now proved a Frankenstein for its union creators?" Frankenstein's creator was God. What Mr. Brams means was the monster created by Frankenstein.

Frankenstein's creator was God only indirectly. His actual creator was Mary Wollstonecraft Shelley, a fact doubtless well known to the erudite Brams. Mr. Duff should know that in this country the monster has taken his maker's name. The movies made it official. This is too late to get it changed back, and besides there is enough confusion in the world without our adding to it.

### Yerden Back

• • • We had hoped that Alfred Yerden, the fraudulent subscription salesman, would be chastened by his prison term for victimizing IRON AGE subscribers, and that he would reform or at least transfer his talents to other fields. But he has done neither, as this receipt reveals:


THE MID-WEST SERVICE
420 So. Kedzie Ave. Chicago, Ill.
No. 543 Date 7/29/43
SUBSCRIBERS PAID IN FULL
BONDED — RECEIPT
Name General Machine Works
Street 209 Oak St.
City Kansas City State Mo.
Paid $ 14.00 for 2 Years
PUBLICATION WANTED
Iron Age
Please Allow 40 Days for First Copy All Subscriptions Must be Paid in Advance
THE MID-WEST SERVICE
428 So. Kedzie Ave. Chicago, Ill.
Representative A Yerden
Dr. Listing Free Trade Lead Service.

The Mid-West Service is the non-existent successor to the non-existent Publishers' Service Bureau. If your eyes are 20-20 you will be able to see from the reproduction that the address of the Mid-West Service is given at the top of the receipt as 420 So. Kedzie Ave., Chicago, and at the bottom as 428 So. Kedzie Ave. On his old receipt form Yerden used the address of 428 Fifth Ave., New York—428 twice, indicating either an impoverished imagination or numerological passion.

The law has proved inadequate in such cases as Yerden's. His particular type of sin permits him no more than three months in which to achieve penitence. This is not fair to Yerden, as he has demonstrated that ninety days barely brings his casehardened skin up to cell temperature, let alone annealing his heart to Christian temper.

But the law allows no more, and as branding is no longer legal, all we can do is to try to jug him again. If he calls on you to collect will you kindly wire us collect, "YERDEN HERE," and we will come arunnin'.

### Puzzles

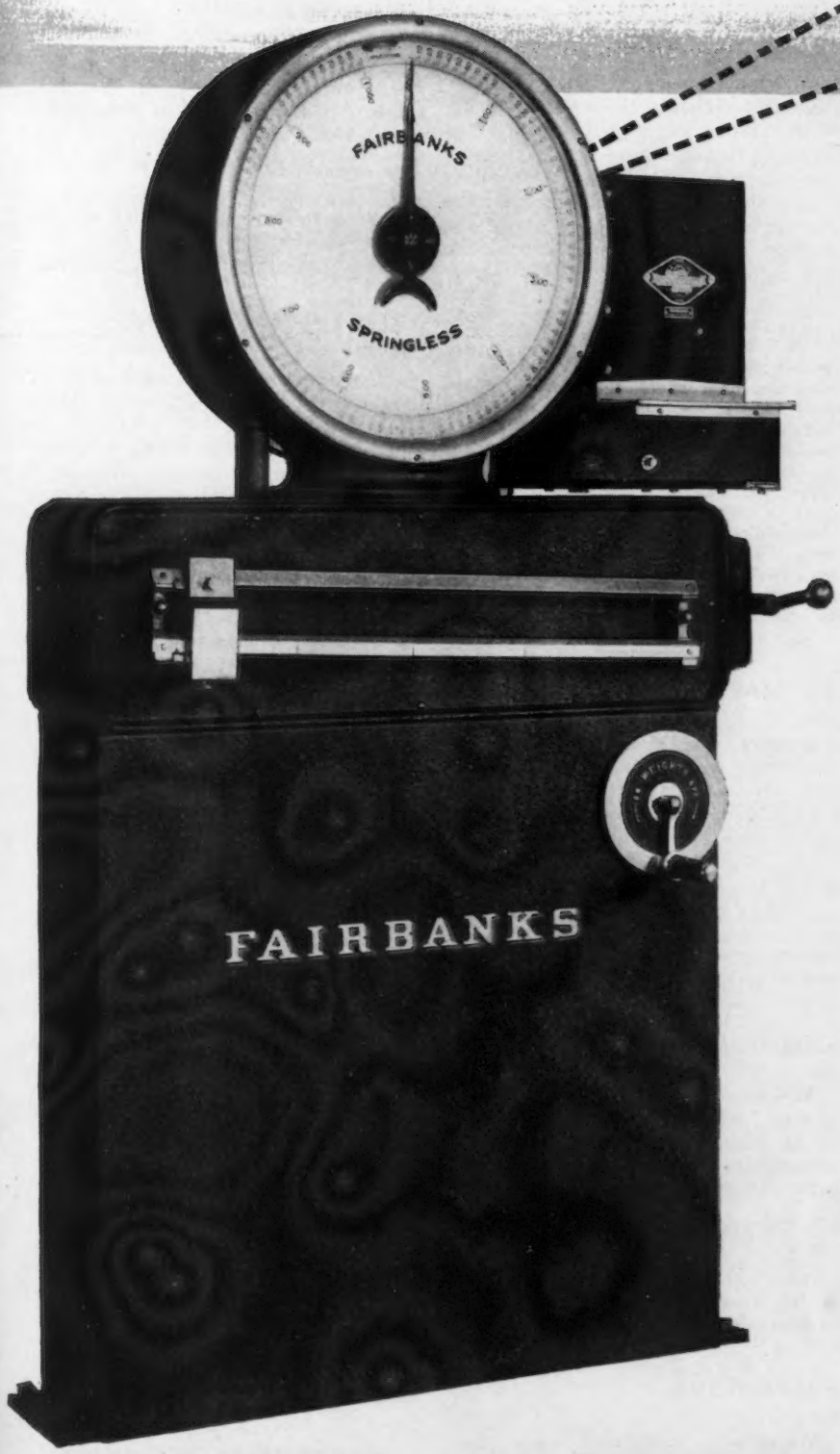
One answer to last week's trifle is $\frac{69}{138} + \frac{27}{54} = 1$

Now that cool weather is coming on we will risk this hairline elevator sent in by W. P. Kelly:

> *A 3 ft. dia. ball rests in the corner of a room. How high must the ceiling be if a second ball will just touch the little ball, the floor, the two walls and the ceiling at the same time?*

# LOOK TWICE!

## IT'S *MORE* THAN A SCALE




SURE it's a scale—a *good* one! NO better weighing machine is made. But this Fairbanks-Morse Dial Scale with Printomatic is more than a scale—and fast, accurate weighing is only one of the jobs it does! For modern Fairbanks-Morse Scales are *tools* that *speed* production.

They keep books, making printed records of incoming and outgoing shipments. They "read" themselves and *print* the weight record on a ticket or tape. They control batching. They measure paint ingredients. They guard secret formulas. They count small parts. They save time and money by preventing human errors. They can be fitted into your production flow to eliminate duplication of effort and accelerate output. If we can't show you how—that's our loss—not yours. Fairbanks, Morse & Co., 600 S. Michigan Avenue, Chicago, Illinois.

**FAIRBANKS-MORSE**

DIESEL ENGINES
PUMPS
MOTORS
GENERATORS
WATER SYSTEMS
SCALES
STOKERS
FARM EQUIPMENT
RAILROAD EQUIPMENT

FAIRBANKS SCALES

Scales

## CHROMIZING

Sir:

I understand that you recently published an article about chromizing, a new process by which carbon steel can be made highly resistant to corrosion.

Would you please advise the name of the company which controls this process?

*W. J. MANCHESTER,*
*Asst. Purchasing Agent*
*Chandler-Evans Corp.,*
*So. Meriden, Conn.*

● We have published two reports on chromizing, one in Oct. 22, 1942 issue, concerning experiments at the Naval Research Laboratory, and the other on Nov. 26, 1942, being a translation of a German report. Obviously, the German equipment is not available. So far as we know, no equipment is now being made in the United States, and work has been purely experimental. More information can be obtained by addressing Messrs. I. R. Kramer and R. H. Hafner, of the Naval Research Laboratory, Washington, D. C.—Ed.

---

## STANDARD FINISHING TIMES

Sir:

Do you have any books or data sheets on the time for finishing work on the various machines in production machine shops?

*J. B. CLARKE*
*Contractors Foundry, Inc.,*
*1922 Brandywine Street,*
*Philadelphia, Pa.*

● See "Time and Motion Study and Formulas for Wage Incentives," by Lowry, Maynard and Stegemerten, McGraw-Hill Book Co., 330 W. 42nd St., New York, $5.—Ed.

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## PLASTER MOLD CASTINGS

Sir:

Who licenses the manufacture of plaster of Paris mold castings?

*A. WEISSELBERG*
*27 Pearl Street,*
*New York*

● Basic patents on the use of plaster for producing casting molds are held primarily by two organizations, the Capaco Patent Corp., 11 So. LaSalle St., Chicago, and the General Motors Corp., which holds what are known as the Antioch patents. The Antioch process was developed by Morris Bean at a General Motors foundry in Antioch, Ohio.—Ed.

---

## CENTRIFUGALLY CAST Mg

Sir:

Your Aug. 26 *News Front* mentions centrifugal casting of magnesium products. Could you give us the name of the foundry?

*MAC SHORT,*
*Vice-President, Engineering*
*Vega Aircraft Corp.,*
*Burbank, Cal.*

● The work thus far has been largely experimental and the companies involved prefer to remain anonymous for the time being. As soon as further information is available for release, it will appear in The Iron Age.—Ed.

---

## CLEANING CASTINGS

Sir:

We have been experiencing considerable difficulty in cleaning catings both ferrous and non-ferrous. Many of these castings have small irregular shaped cored passages. We have found that various pickling solutions do not completely remove all of the foreign particles 100 per cent. Can you help us?

*J. R. CHISHOLM*
*Commercial Filters Corp.,*
*A and West Third Streets,*
*Boston, Mass.*

● For thorough yet gentle cleaning of hard-to-clean castings, the hydraulic blasting systems employing water and sand under pressure, appear to be doing an especially good job. It might be worth while to investigate them. If the "foreign particles" you mention are sand particles, perhaps an adjustment of the core mixture or the molding sand mixture might help eliminate this. Harry W. Dietert Co., 9330 Roselawn Ave., Detroit, has done some outstanding work on the subject and might be able to offer some suggestions.—Ed.

---

## JAP MAP

Sir:

I have discovered that your organization has put out a most helpful map on Japan's war industries. I need a copy for my radio work.

*GREGOR ZIEMER*
*WLW,*
*Cincinnati*

● The map was published as a supplement to our April 30, 1942 issue. We have no more copies of the issue or the map. However, it may be possible to get a copy from a back number dealer.—Ed.

---

## STEEL-ALUMINUM SHEETS

Sir:

We understand that a sheet made of steel, aluminum and magnesium is to be placed on the market, or is already there. Can you give us any information about it?

*A. H. KAPPENBERGER,*
*Chief Marine Division*
*Peerless Steel Equip. Co.,*
*Unruh & Hasbrook Sts.,*
*Philadelphia*

● This is unknown to us. Armco is selling an aluminum coated steel sheet.—Ed.

---

## GALVANIZING

Sir:

We recently installed a hot-dip galvanizing plant, and would appreciate if you have any book describing this process. We are particularly interested in pickle and dipping process.

*ALEX DeBOGORY*
*U. S. Foundry & Mfg. Corp.,*
*422 N.W. First Court,*
*Miami, Florida*

● The best book on this is "Galvanizing," by Heinz Bablik, a German engineer. The English translation is available from the Chemical Publishing Co., 148 Lafayette St., New York, $8. A consultant on hot-dip galvanizing is Wallace G. Imhoff, Vineland, N. J. Mr. Imhoff has published a number of books and pamphlets on the subject.—Ed.

---

## BURN HEALER

Sir:

Where can we obtain Hexene-ol, the quick healing burn treatment, mentioned on page 69 of your Feb. 11 issue?

*THOMAS FRANCIS & CO. LTD.*
*Sparbrook Works,*
*Leeds, 12, England*

● Write to Dr. Benjamin Levine, Mt. Sinai Hospital, Cleveland.—Ed.

---

## CENTRIFUGAL CASTINGS

Sir:

From an article in your April 22 issue, we understand the War Metallurgy Committee has prepared and published a bibliography on centrifugal casting of metals. We would like to know the address of the agency from which this material may be secured.

*P. E. MEIDENBAUER,*
*Project Engineer*
*Scott Aviation Corp.,*
*Lancaster, N. Y.*

● A similar bibliography on centrifugal castings has been published in The Iron Age. See page 68 of the May 20, 1943 issue.—Ed.

---

## STEEL ANALYSES

Sir:

We are interested in obtaining a sheet or pamphlet that would give us the chemical composition of all of the steels in common use today.

For example, we are able to get information on some of the NE steels and the majority of the SAE items, but there will always be numbers coming up that none of the charts seem to contain. We refer today particularly to the 9100 Series.

*F. I. KILCHINE*
*Luntz Iron & Steel Co.,*
*522 Armstrong-Landon Bldg.,*
*Kokomo, Ind.*

● We know of no up to date list. Changes are so frequent that any list is almost certain to be incorrect a few weeks after issuance. The best thing to do is to take a good basic list, as for instance The Iron Age NE Steel-Standard Steel Chart, issued May 6, and make revisions as reported in The Iron Age.—Ed.

---

## STEEL TERMS

Sir:

Can you tell me where I can purchase a document giving definitions of terms used in the steel industry?

*C. E. HAND*
*143A Keewatin Avenue,*
*Toronto, Canada*

● See "Iron and Steel," a pocket encyclopedia, by Hugh P. Tiemann, published by McGraw-Hill Book Co., 330 West 42nd St., New York.—Ed.

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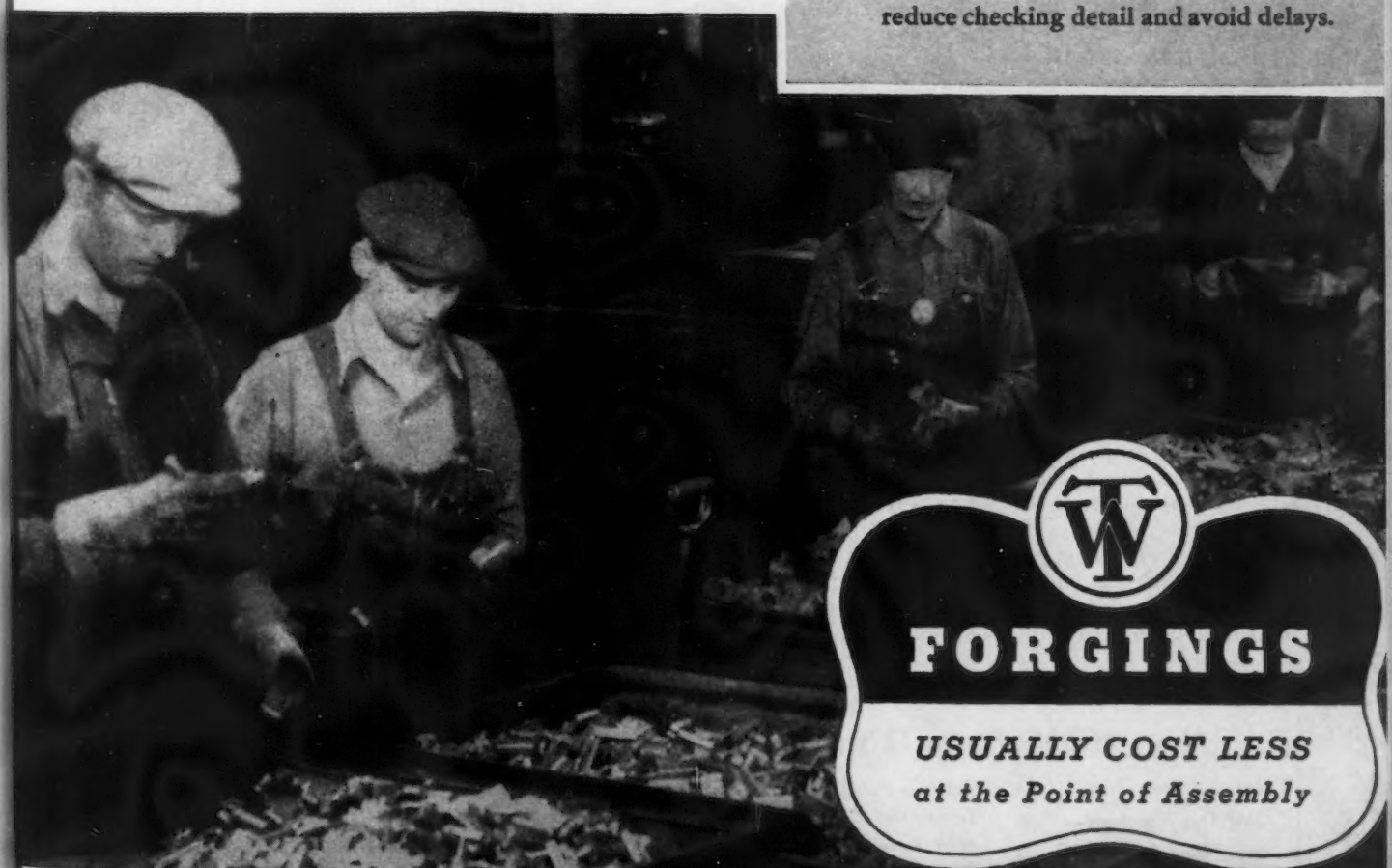
Conducting a close visual and technical inspection of forgings, involving the use of modern mechanical devices, T & W inspectors spot forgings which fail to meet the usual T & W standard. T & W inspectors are responsible direct to management itself. Such pre-inspection protects you from receiving forgings that might involve a waste of materials or a waste of time in finishing forgings. Ask a T & W Forging Engineer about gaining time through the use of pre-inspected forgings.

Steel for T & W Forgings is given a thorough laboratory inspection before it ever reaches the heating furnaces and forging hammers. Using quality material, working in accordance with fixed standards controlling the uniformity of physical structure and the size, shape and surface finish of forgings, T & W forging craftsmen produce forgings that reduce checking detail and avoid delays.



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# This Industrial Week . . .

- **Steel Industry Completes Big Month**
- **Ingot Output This Week Up One-Half Point**
- **Industry's Feat Comes Despite Manpower Muddle**
- **Deficiency in 1944 Food Production Looms Up**

STEEL mills are completing a sensational month, with average weekly production of ingots perhaps the highest on record. Even though September is a short month, total output promises to push close to the all-time peak set last March. This week THE IRON AGE estimates national ingot operations at 100 per cent, up one-half point.

New orders are exceeding actual shipments and authentic backlogs are reaching an unprecedented total. In some cases mills are booked up on sheets until next June. New military projects, which include one program requiring around 130,000 tons of plates, sheets, bars and structurals, must somehow be wedged into producers' books.

The industry's current all-out drive for more production is all the more impressive in the light of manpower shortages and flash strikes. Like other industries, steel's main problem now is the necessity for straightening out promptly the manpower muddle. While Congress discussed the drafting of fathers, draft boards in certain areas were calling them on a large scale. Meanwhile, labor was being hoarded in some war factories and a few workers were studying the calendar to determine the date when they will begin to lay off to avoid paying federal income taxes. War plants in certain areas have noted an increase in the number of women quitting their jobs to return to their homes. Manpower now rates importantly in the placing of war contracts, indicating that some critical areas will not receive the same amount of business as formerly.

A SIDELIGHT on the labor situation is the reported recruiting of a large number of experienced plate mill workers, lured to a new plant from an important mill in the Middle West.

The flat rolled steel situation certainly is tighter now than at any time since the war began, result of heavier requirements for shipbuilding plates plus a gain in steel sheet needs. Many tin plate orders have been pushed back. Only about half of the hot rolled sheets needed for a large container program for the government have been placed so far.

## News Highlights in This Issue


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Utilizing all of the nation's electric furnace steel capacity is as great a problem as it was a few weeks ago when WPB appealed for wider use of the high quality steel. A few electric furnace units have been idle for lack of orders and one electric furnace plant has been melting open hearth steel in its units at considerable financial loss per ton of billets produced, just to keep the equipment busy and to help meet commitments.

Seeking permission to use electric furnace steel and to obtain delivery of it quickly, some war contractors have gone through considerable red tape to secure changes in old orders which originally called for open hearth alloy. Recent reports indicate that open hearths in August produced about 69 per cent of the alloy steel whereas a few months earlier they accounted for 73 to 75 per cent of total alloy steel production.

Meanwhile, farm implement makers, despite governmental promises that they would be taken care of on their steel requirements, are finding it difficult to secure space on mill books due to delay in receiving allotments. On top of this, the industry's rating for CMP Class B products has been dropped to AA-2, making it still more difficult to get component parts for tractors, combines, reapers, etc.

Apparently the confusion in the farm machinery picture is arising from failure of governmental agencies to develop and activate a well rounded production program which would include component parts, as well as steel sheets and bars. A tractor, complete except for a magneto, is useless.

THE real damage caused by the delays in the farm machinery program will not be fully apparent until the 1944 crop harvesting period. With farms being squeezed for manpower, machinery is the only alternative for averting a serious deficiency in 1944 food production.

Specialty steel distributers definitely are worried over the possibility of large obsolete stocks in the hands of terminated war contractors demoralizing the market. The question arises whether the warehouses will take over these stocks themselves in the hopes that they can be disposed of in an orderly manner even though at considerable risk, or whether they will be turned loose on the open market.

WPB's recent letter prohibiting the acceptance of steel orders which have not been granted allotment numbers, has had little effect upon steel company order books. Most of this tonnage was cleared away before July 1. It is believed that the WPB by saying that no CMP order without allotment numbers could be accepted might have been aiming at preventing the building of neutralized backlogs for postwar shipment.

Fervent hopes for the success of the national scrap campaign starting Oct. 1 are being expressed

throughout the steel industry. The burden rests upon industrial collections, since auto graveyard and home collections are apt to be lower than they were a year ago. The more scrap that can be deposited in the "Victory Scrap Banks" which communities over the nation will assemble, the greater will be the insurance against any dangerous shortages in the production of war equipment to keep pace with military requirements. The scrap will flow from the banks, to dealers, to consuming mills, as needed.

The war contract termination proposal made by Senator Murray of Montana has been attacked by Comptroller General Warren, who also attacked all the termination regulations issued by the war agencies. It is believed his objections will cause a sweeping revision of the bills now pending.

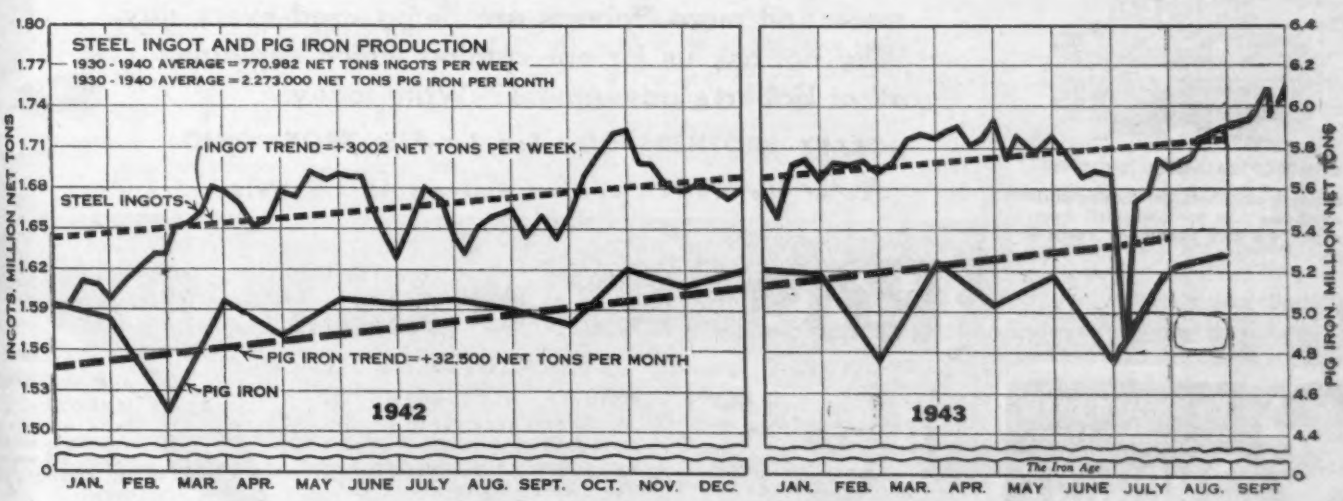
PRESIDENT ROOSEVELT has announced the creation of a joint Production Survey Committee to insure that military programs are kept in step with altered military objectives and that production programs are changed in accordance with lessons from the battlefields and assembly lines. WPB officials say that production schedules will be cut back realistically by the committee which is to be responsible to the joint chiefs of staff.

The WPB Steel Division and other WPB divisions now located in Washington are not slated for moves to the field in WPB's present decentralization plans, which call for lessening of paper work through giving increased authority to field offices. Meanwhile, the proposed Coordinated Authorization Procedure which was advanced last month, may be held in abeyance.

Recent shell contracts have been let at lower prices than previously, according to reports, and this may have repercussions in demand for lower prices on raw materials by shell makers . . . Although Russia several weeks ago was reported to have cancelled at least some Lend-Lease steel, hardly a dent has been made in the tight overall steel supply situation . . . Attempts to obtain more steel for the nation's railroads are believed likely to succeed due to the critical condition of tracks and rolling stock, a condition which is reported in some quarters to have convinced the government that it would be poor policy to take over the carriers now. Juggling of the Class B list has occurred on railroad products . . . Discussing needed steels in Milwaukee recently, R. B. Schenck, Buick's chief metallurgist, expressed the opinion that even if our entire supply of commonly used alloying agents should be cut off, steels of comparable characteristics could be produced by the use of certain ferro-alloys containing boron, known as special addition agents . . . Secretary Ickes has commended West Coast oil operators for saving approximately 75,000 ft. of oil well casing per month, by reclaiming, for a total of a million feet to date . . . By the end of 1944 the shipyards of the United States will have delivered more deadweight tonnage of ships than was possessed before the war by all the fleets of the United States, Britain, Japan, Germany and Norway, says Rear Admiral Land . . . Shipments of machine tools for August totalled $87,827,000, a decline of approximately 10 per cent in value from the July total of $97,541,000. Total orders received for August were $40,192,000 or approximately three per cent less than the July order total of $41,447,000. Cancellations for August were $6,814,000, a decrease of approximately 46.5 per cent from the July cancellations.

STEEL ingot production has increased this week in several districts. Operations have increased half a point in both Pittsburgh and Chicago to 102 and 100 per cent respectively, while Wheeling output has gained one point to 103 per cent. In Detroit ingot production has increased two points to 98 per cent from last week's revised rate of 96. Only declines of the week occurred in Cincinnati where the rate has dropped two points to 103 and in the small Eastern district which is operating at 93 per cent of capacity, down eight and a half points. Unchanged are Youngstown at 97, Cleveland at 97.5, Buffalo at 104.5 and Birmingham at 102.

The Iron Age


STEEL INGOT AND PIG IRON PRODUCTION
1930-1940 AVERAGE = 770,982 NET TONS INGOTS PER WEEK
1930-1940 AVERAGE = 2,273,000 NET TONS PIG IRON PER MONTH
INGOT TREND = +3002 NET TONS PER WEEK
STEEL INGOTS
PIG IRON TREND = +32,500 NET TONS PER MONTH
PIG IRON
INGOTS, MILLION NET TONS
PIG IRON, MILLION NET TONS
1942
1943
JAN. FEB. MAR. APR. MAY JUNE JULY AUG. SEPT. OCT. NOV. DEC.
JAN. FEB. MAR. APR. MAY JUNE JULY AUG. SEPT
The Iron Age

## Steel Ingot Production by Districts and Per Cent of Capacity

| Week of | Pittsburgh | Chicago | Youngstown | Philadelphia | Cleveland | Buffalo | Wheeling | South | Detroit | West | Ohio River | St. Louis | East | Aggregate |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| September 23... | 101.5 | 99.5 | 97.0 | 93.5 | 97.5 | 104.5 | 102.0 | 102.0 | 96.0* | 95.0 | 105.0 | 106.5 | 101.5 | 99.5 |
| September 30... | 102.0 | 100.0 | 97.0 | 93.5 | 97.5 | 104.5 | 103.0 | 102.0 | 98.0 | 95.0 | 103.0 | 106.5 | 93.0 | 100.0 |

* Revised.

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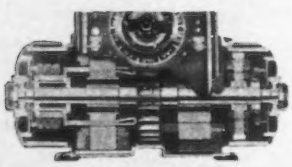

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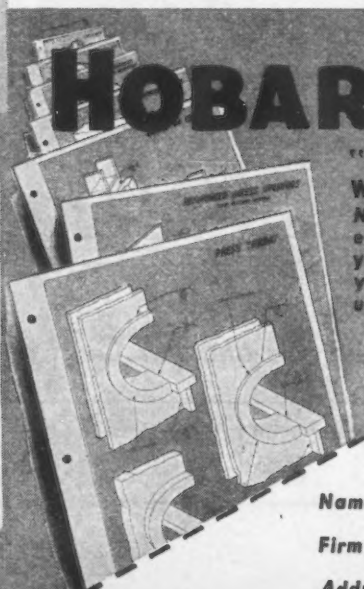

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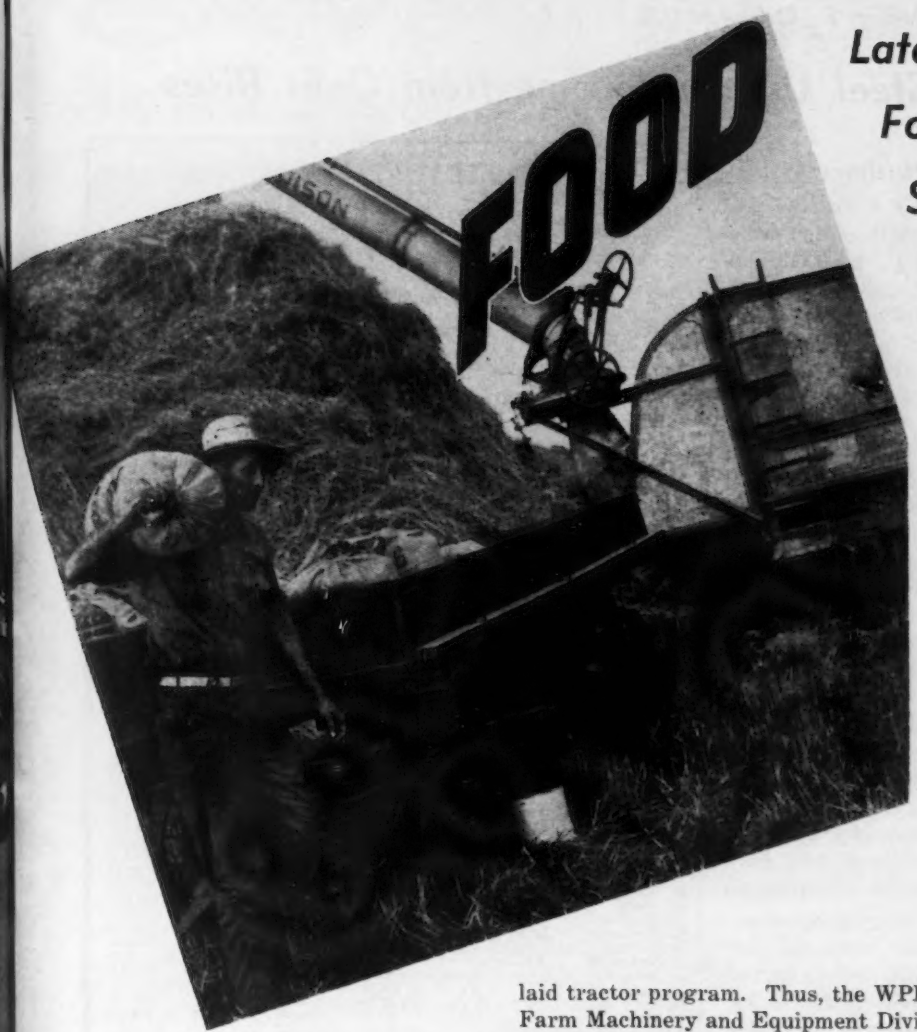



# Late CMP Allotments For Farm Implements Seen Threatening 1944 Food Crop Harvesting

o o o

*Chicago*

• • • **Farm equipment scheduled** for delivery during the 1944 crop season may be delayed tragically by weeks or months unless priority relief can be given to speed delivery of fabricated components and, to a lesser extent, controlled materials, the nation's principal manufacturers agree.

If a combat weapon program is delayed a month, a military campaign may be delayed for a like period, but unless farm equipment catches the 1944 crop train it will have to wait an entire year for another to come along.

Dropping of the industry's rating for CMP class B products to AA-2 has provided an obstacle in component procurement which was not present last year. In some cases suppliers have flatly stated that they cannot supply sufficient components of certain types to allow manufacturers to produce as many farm machines as are allowed under the L-257 scheduling order. Because a tractor without a magneto, for instance, is as bad or worse than no tractor at all, lack of magneto accessory could wreck a well-laid tractor program. Thus, the WPB Farm Machinery and Equipment Division will have to persuade some military claimant agencies to defer their requirements for certain essential components if sufficient farm machines are to roll on time.

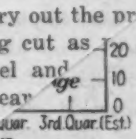
Fear of the industry with regard to controlled materials is not so much that orders will not be filled as that they will not be filled in sufficient time to meet production schedules dictated by the crop seasons. A firm conviction, supported by plausible evidence, exists that the controlled materials plan has been perverted to bring back in effect many of the evils inherent in the old priorities system. Farm equipment makers who also hold Army and Navy contracts—and there are many of them—declare that allotments of material for the military contracts were received prior to those for the farm equipment program. Thus, in particularly critical items such as hot rolled sheets, mills' books were filled when attempts were made to place farm equipment tonnages, and the farm equipment makers were forced to place tonnages against their advance allotments for succeeding quarters, throwing off the necessarily clocklike manufacturing schedules by months.

(Small producers are no longer required to file applications for last quarter 1943 and for first three quarters of 1944 for controlled materials, as allotments previously made are firm allotments. Provision is made, when allotments do not meet requirements of any one quarter, to provide supplemental authorizations.)

The theory that mill capacity exactly matches WPB allotments apparently has been thrown askew, possibly by unchartered use of advance allotments as to particular items within controlled material groups, and possibly by failure to break down such controlled material group as "carbon steel" when issuing allotments.

When the new farm machinery scheduling order, L-257, was issued to replace the old L-170 there was rejoicing in the industry over a substantial increase in the number of machines whose production would be allowed, thus tossing a sop to farm organizations and congressional groups who insisted on calling attention to the lack of machines necessary to meet crop production programs. The L-170 order, as originally issued, allowed manufacturers to make approximately 20 to 25 per cent of 1940 production for the 1943 crop season, but this figure was later raised through appeals and adjusted quotas allowing the industry to draw on material inventories.

The L-257 order, setting quotas for the machinery program now getting underway, provides about 80 per cent of 1940 on implements and wheel tractors. The joy over this increase has been cut short by failure of the industry to receive sufficient controlled material allotments to carry out the program, some firms being cut as much as 20 per cent on steel and [illegible] cent on copper. Last year [illegible] provided a reserve on [illegible]

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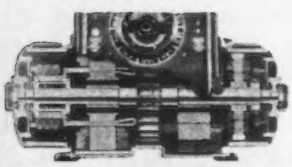

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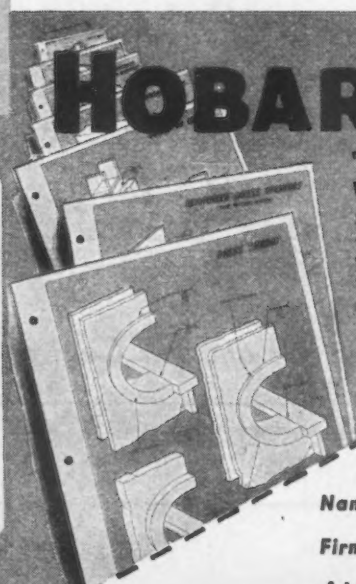

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*News of Industry*

if materials or components did not come through on schedule, and thus maintain manufacturing schedules. This year there are no reserve inventories and manufacturers are entirely dependent on allotments and what they can scrape up through the WPB redistribution program.

Bearings universally are the biggest headache. Transmission gears are also causing much difficulty, probably due to a shortage in production capacity. A vital item for nearly all tractors, combines and bailers—roller chain—is tight, and getting tighter. Small engines, necessary for combines, are more difficult to procure than last year, when they were a sore spot. Magneto parts, bearing liners, valves, thermostats, piston pins, oil seals, radiators, all are on the various critical lists.

• • • **Present and future** distribution of farm implements and related lines will be discussed at a "National Food Producing Equipment Conference" to be sponsored by the National Retail Farm Equipment Association Oct. 12 and 13 at the Hotel Sherman, Chicago.

Despite their critical plight, industry representatives are extremely loath to complain too loudly. Several months ago Drew Pearson, Washington columnist, now an administration target for charged inaccuracies, accused the industry of holding back on repair parts manufacture in order to fan the demand for new machines. Production figures refute Pearson's statements completely. A principal factor in the industry in the first eight months of its 1943 fiscal year, starting Nov. 1, 1942, produced in weight almost the equal of its entire 1942 fiscal year, exceeded its 1941 fiscal year by 12,000,000 lb., and its 1940 fiscal year by 19,000,000 lb.

Under the current L-253 scheduling order, the industry theoretically is allowed to make as many parts as it wishes. Again, controlled material allotments fail to live up to the promise of the order, providing only sufficient controlled materials to make about 165 per cent of 1940 production. Under L-170, for the 1943 crop year, production was limited to 160 per cent of the 1940-1941 average. In the 1943 season, implements were late for the early crop areas, such as the South and the Far West. For 1944, there is a good possibility that they may be late for the entire country.

## Steel Union's Income from Dues Rises

***Pittsburgh***

• • • **For the** six-month period from Dec. 1, 1942, to May 31, 1943, the United Steel Workers of America received initiation fees amounting to $362,821 and dues amounting to $3,629,879. This compares with the previous seven-month period from May 1, 1942, to Nov. 30, 1942, when initiation fees were $394,069 and dues were $3,150,874. The latest period covers a time when maintenance of membership deductions from workers' pay was generally operative.

The comprehensive financial report which has been released by the union, and which probably represents one of the most complete in the union field, says that current membership amounts to 745,000. This compares with 725,625 when the previous report was issued, this year.

Considerable emphasis is being placed on the drive for members at plants of American Rolling Mill Co. and the Weirton Steel Co. In the six months from Dec. 1, 1942, to May 31 of this year, regular district personnel covering those two spots amounted to 45 employees.

UNITED STEELWORKERS OF AMERICA

*Statement No. 3*

Summary Statement of Initiation Fees, Dues, and Per Capita Refunds, by Districts
December 1, 1942 to May 31, 1943

| | DISTRICT | Receipts: Initiation Fees | Receipts: Dues | Per Capita Refunds: Initiation Fees | Per Capita Refunds: Dues |
|---|---|---|---|---|---|
| 1 | New England | $ 9,673.00 | $ 65,916.75 | $ 3,224.35 | $ 16,668.13 |
| 2 | New York City | 10,765.00 | 74,513.00 | 3,672.33 | 18,628.25 |
| 3 | Utica, N. Y. | 9,092.00 | 60,253.00 | 3,030.67 | 15,063.25 |
| 4 | Buffalo, N. Y. | 14,873.00 | 138,857.39 | 5,657.67 | 34,611.50 |
| 5 | Eastern Canada | 240.00 | 36,550.98 | 80.00 | 9,137.76 |
| 6 | Central and Western Canada | 4,548.00 | 87,908.00 | 1,570.00 | 22,302.08 |
| 7 | Philadelphia | 18,025.00 | 145,970.50 | 6,008.33 | 36,555.08 |
| 8 | Baltimore | 4,737.00 | 59,205.00 | 2,377.00 | 14,801.25 |
| 9 | Bethlehem, Pa. | 8,951.00 | 112,550.00 | 3,511.91 | 28,233.92 |
| 10 | Wilkes-Barre | 3,631.00 | 53,264.00 | 1,210.34 | 13,316.00 |
| 11 | Harrisburg | 3,459.00 | 90,747.00 | 1,153.00 | 23,090.25 |
| 12 | Johnstown, Pa. | 4,370.00 | 81,804.00 | 1,174.00 | 20,214.75 |
| 13 | Charleroi-Monessen | 6,890.00 | 91,812.00 | 2,296.67 | 22,948.75 |
| 14 | McKeesport | 561.50 | 69,367.00 | 187.17 | 18,992.00 |
| 15 | Homestead | 14,145.00 | 134,354.20 | 8,266.67 | 32,838.55 |
| 16 | South Side-Hazelwood | 7,691.00 | 54,360.22 | 4,520.35 | 13,807.70 |
| 17 | Lawrenceville-North Side | 5,193.00 | 47,879.00 | 1,758.99 | 11,969.75 |
| 18 | McKees Rocks | 9,550.00 | 67,529.80 | 3,183.33 | 16,911.35 |
| 19 | Tarentum | 13,000.00 | 152,430.00 | 4,498.34 | 37,676.75 |
| 20 | Ambridge | 14,461.00 | 139,129.00 | 4,820.35 | 35,133.95 |
| 21 | Sharon | 13,044.00 | 104,724.70 | 5,709.00 | 26,230.10 |
| 22 | Charleston, W. Va. | 1,629.00 | 22,804.00 | 543.00 | 5,701.00 |
| 23 | Steubenville-Wheeling | 10,630.00 | 110,398.25 | 3,514.68 | 27,722.11 |
| 24 | Columbus | 4,088.00 | 44,381.90 | 1,362.67 | 11,897.40 |
| 25 | Cincinnati | 4,074.00 | 33,426.25 | 1,358.00 | 7,686.60 |
| 26 | Youngstown | 8,210.00 | 175,227.25 | 3,304.67 | 45,456.37 |
| 27 | Canton | 4,999.00 | 118,142.93 | 1,514.83 | 31,340.25 |
| 28 | Cleveland | 13,051.75 | 166,392.00 | 6,544.58 | 45,641.30 |
| 29 | Detroit | 10,989.00 | 68,508.00 | 4,264.01 | 17,533.00 |
| 30 | Indianapolis | 14,871.00 | 82,507.25 | 4,957.00 | 21,379.49 |
| 31 | Calumet | 44,162.50 | 401,737.64 | 20,336.84 | 102,832.91 |
| 32 | Milwaukee | 16,195.00 | 114,045.00 | 5,433.35 | 29,562.32 |
| 33 | Minnesota and Iron Ranges | 7,844.00 | 88,462.00 | 2,614.66 | 22,494.50 |
| 34 | St. Louis | 19,152.00 | 109,907.55 | 6,388.67 | 30,069.95 |
| 35 | Southeastern | 2,783.50 | 12,123.75 | 927.84 | 3,164.51 |
| 36 | Southern | 4,441.00 | 64,768.10 | 1,503.99 | 16,448.77 |
| 37 | Texas | 305.00 | 19,932.50 | 101.68 | 5,637.13 |
| 38 | West Coast | 18,226.75 | 121,640.80 | 6,244.59 | 35,550.88 |
| 39 | Utah | 269.50 | 6,348.75 | 89.83 | 2,595.15 |
| | TOTALS | $362,820.50 | $3,629,879.46 | $138,915.36 | $931,844.74 |

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## Survey Shows Drop in Unfilled Orders

***Cleveland***

• • • **Backlogs** of unfilled orders that extend far into the future are being rapidly wiped out, according to a WPB Fifth Regional survey. Where companies had been reporting backlogs of unfilled orders extending beyond one year, many have been able to reduce the delivery time of such orders, many to within six to 12 months and some to within six months.

This favorable turn has been the result of a variety of factors. Many have been able to eliminate production and engineering difficulties that plagued them when they converted from peace-time to war production. In addition, some companies report that, because of CMP and the ironing out of material supply difficulties, production has been increased.

In the WPB survey, more than 500 metal working and fabricating plants in the region, excluding aircraft, shipbuilding, machine tool, railroal repair, and metal smelting plants, reported. The results in brief:

| Date of Survey | Per Cent of Total Companies That Have Backlogs of: 6 Mo. or Less | 6 to 12 Months | 12 to 24 Months | Over 24 Months |
|---|---|---|---|---|
| Sept., 1942.. | 37.9 | 35.1 | 18.1 | 8.9 |
| Feb., 1943.. | 35.3 | 39.8 | 18.7 | 6.2 |
| April, 1943.. | 47.4 | 37.0 | 12.0 | 3.6 |
| June, 1943.. | 43.8 | 41.1 | 12.1 | 3.0 |

# 69% of Alloy Steel Scheduled for Open Hearths; Differential is Problem

*Pittsburgh*

• • • **The production of alloy steel** so far this year has been at a fairly high level, but changes have occurred reflecting, for at least the first quarter this year, a more rapid growth in the percentage of alloy steel turned out by open hearth furnaces. Recently, the War Production Board has been attempting to swing more alloy steel production to electric furnaces.

Despite the rapid growth in electric furnace capacity, and despite the increase in electric alloy steel production on a tonnage basis, estimates for the third quarter of this year indicate that about 69 per cent of alloy steel production will be made in the open hearths, and 31 per cent in the electric furnaces. During the first quarter of 1942, open hearth alloy constituted 67 per cent of the total and electric 33 per cent.

Early this year, the WPB, fearing a substantial shortage in alloy steel, encouraged more and more production in the open hearths. During the first three months of 1943, 75 per cent of the total alloy steel production was made in open hearths.

**While total alloy** steel output increased rapidly from January, 1942, to January of 1943, production since that time has been stable. With total steel production having increased substantially, the per cent of alloy steel output to total steel production has declined recently. During the first quarter of 1942 alloy steel constituted about 10 per cent of total steel output. It climbed rapidly, on a percentage basis, until in the first quarter, 1943, alloy steel constituted 17 per cent of total steel output. The third quarter participation of alloy steel to total steel production is estimated at 14½ per cent.

As reported in THE IRON AGE previously, there is considerable reluctance on the part of some consumers to change from open hearth alloy to electric alloy. The main stumbling block is the $10.00 a ton premium for electric steel, although some consumers insist that their open hearth alloy supplies have been satisfactory and latest reports disclose some resistance to WPB's attempt for a change-over.

The present easiness in electric alloy steel has not sprung from a decline in demand or production, but rather because of the rapid acceleration in new electric capacity. The chances are that some alloy steels now being made in the open hearth may go over to electric furnaces. During July and August 69 per cent of alloy steel production came from the open hearths, contrasted with 75 per cent earlier in the year. Furthermore, actual production figures, which are restricted for publication on a monthly basis, indicate a decline in open hearth alloy tonnage during the past five weeks.

It has been reported in some circles that government contracts may have to be readjusted to take care of the substitution of the electric alloy for open hearth alloy, in view of the higher price. The alloy steel market was upset recently by reports that electric alloy steel has been sold at the open hearth alloy price. However, it is understood that this condition involved isolated cases, and that the concession was withdrawn shortly after it was offered. Meanwhile, some electric furnaces have been down recently due to having more capacity than orders.

The expansion program for electric furnace steel will be 85 per cent complete on Oct. 1.

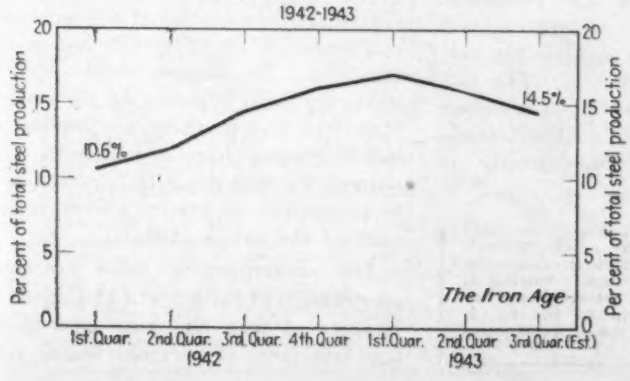
According to John Whiting, director of the WPB steel division, "there need be no unsatisfied requirements for alloy steel from here on. For the first time since the start of the war, alloy steel supply can meet the total, overall demand."

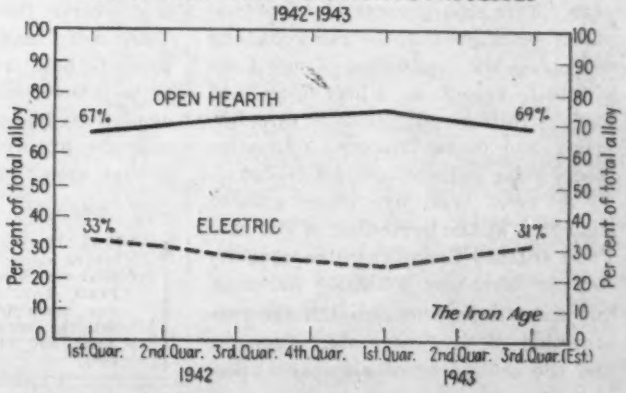
**• • • Close to another million tons of electric steel capacity will be added during the last three months of 1943, when the entire electric furnace program is scheduled to be completed, J. T. Whiting, director, Steel Division WPB, told Iron and Steel Engineers in Pittsburgh at the Association's annual meeting.**

**"We cannot afford to have idle electric furnace capacity because of this expansion, and because of our past successful efforts to produce so large a part of the required alloy steel in open hearth furnaces" Mr. Whiting said.**

**"We need the open hearth capacity, which would be opened up for carbon steel requirements through reduction of open hearth alloy steel production. The electric furnace's special advantages, such as the maintenance of closer analysis limits, must now be more fully utilized for making gun, aircraft and tool, and other special steels" he asserted.**

**Mr. Whiting argued that for the first time since the beginning of the war, alloy steel supply can meet the total, overall demand. There need be no unsatisfied requirements for alloy steel from here on he said; but he did warn that we need more high quality carbon steel.**


PER CENT ALLOY STEEL OUTPUT TO TOTAL STEEL PRODUCTION
1942-1943
Per cent of total steel production
10.6%
14.5%
The Iron Age
1st Quar. 2nd Quar. 3rd Quar. 4th Quar 1st Quar. 2nd Quar 3rd Quar.(Est)
1942
1943



# CANADA

## Post-War Plans of Dominion Include More Exports, 50% Less Steel Imports

***Toronto***

• • • **Canada's industrial leaders, in cooperation with various government agencies, have embarked upon a postwar program designed to place the Dominion among the leading manufacturing and exporting nations of the world. The heavy war demands placed on Canadian industry have resulted in the building of a productive power many times greater than that which prevailed at the end of 1939. Associated with the plant expansion program, which represented an expenditure of approximately $1,750,000,000, about half of which was provided by the Canadian and United Kingdom governments, many new lines of industrial production have been introduced into Canada in the past four years.**

**Plant expansion carried out since 1939 was almost exclusively on war account, but it will be important in the post-war period, not only for the production of numerous new items for export, but also to provide to a greater extent, goods formerly imported into the Dominion. The iron and steel industry provides an example of what has been done in the way of production expansion. At the end of 1939, Canada's capacity for the production of steel ingots and castings was rated at 2,346,000 net tons, whereas today it totals upwards of 3,500,000 tons per year. This enlargement increased capacity by more than 50 per cent, and reflects in the production of new lines of steel, especially alloy steels and various rolling mill products that formerly had to be imported. In alloy steels alone current production capacity is more than five times greater than that at the beginning of the war. Prior to 1940 Canada's rated capacity for pig iron was 1,625,000 net tons, but since that time, through the construction of four new blast furnaces and the rebuilding of old stacks, production capacity has been established at a total of 2,710,000 tons yearly.**

**With the war outlook improved and the end of hostilities drawing nearer, the Canadian government and industrial leaders are giving more attention to peace-time activities. They are laying plans for widespread production operations and maintaining maximum employment for the thousands of new workers that have been trained. With this object in view, attention is being given to the export markets. Canadian industry recognizes that it is its duty and its interest to do everything possible to develop new types of products, materials and processes**

**To further the efforts of the Commercial Intelligence Committee of the Department of Trade and Commerce, a sub-committee has been formed to place more emphasis on export trade so as to hold, as far as possible, contacts in overseas markets. The subcommittee is composed of 20 members who are experienced in export trade. It is under the chairmanship of Arthur G. Lambert, manager of the export division of Atlas Steels Ltd., Welland. A smaller working committee, with Mr. Lambert as chairman and E. Baker of Modern Tool Works Ltd., Toronto, vice-chairman, also has been set up.**

**In addition to the campaign for an increase in Canada's export trade, it is generally believed by industrial heads that under the stimulated manufacturing facilities that will be available for much more diversified lines of production, the country will be in a position substantially to reduce imports, especially in iron and steel and their manufactures. Curtailment in this direction would chiefly affect the United States as for many years past Canada has been America's best customer with regard to iron and steel and their products. Of Canada's total imports of iron and steel and their products for the year 1938 valued at $209,236,711 the United States provided $170,603,311, with corresponding ratio for earlier years. However, during the war years imports in these groups shot up to more than double previous levels.**

**While there may be conjecture regarding Canada's position on importations of iron and steel and their products in the post-war period, it is the opinion of steel interests that they will be reduced by at least half the pre-war totals, due to the fact that Canadian industry now is producing many articles that formerly had to be imported. In addition other plants have increased capacity to an extent that will enable them to provide a much greater part of domestic requirements and domestic sources are in a position to supply a very large part of the raw materials.**

**The accompanying table presents an example of the growth of Canada's imports of iron and steel and their products from the United States for**

**VITAL LINK: This newly completed bridge above on the Alaska Military Highway reaches 2275 ft. across the Peace River in British Columbia. It was completed in record time under the supervision of the U. S. Army and Public Roads Administration.**

the period 1935 to 1938 inclusive, with later figures not made public by the government, although imports of these commodities have shown a definite upward trend from 1938 to 1943.

For the years 1940, 1941 and 1942 imports of iron ore from the United States totaled approximately 3,000,000 tons per year, while there were practically no importations of pig iron. Although these totals have reached record proportions, possibilities are that after the war they may drop sharply and even fall below the average for the four years preceding 1939. This is possible due to the fact that since 1939 one iron mine has been brought into production in Canada and now is operating at a rate of about 450,000 tons a year. Of this total some 300,000 tons of sinter iron is being exported to the United States. Steep Rock Iron Mines is slated to come into production in Canada during the latter part of 1944.

While Canadian industrial leaders appear to favor a prediction regarding a 50 per cent reduction in imports of iron and steel and their products from the United States following the war, it is generally conceded that there are many special lines that will continue to be brought into the country as facilities have not yet been provided for their manufacture. Included in the latter group would be heavy structural sections, as blooming mills have not the size and capacity to handle the large ingots. Pigs, blooms, and billets will continue to be imported. Some castings and forgings will remain on the import list. A number of rolling mill products will be imported due to patent rights which are not available to Canadian makers. Tube, pipe and fittings, especially in seamless types and those with special alloy content, are other items that appear slated to remain in the import group. Special grades of wire, hardware and cutlery will remain on the import list.

# Ore Supply, if Properly Distributed, Seen Sufficient for Winter Requirements

*Cleveland*

• • • In attempts to forecast the available supplies of scrap, ore and coal during the coming Winter months, considerable emphasis has been placed on the late opening of ore shipping and the behind-schedule shipment downlake of 8,000,000 tons of ore this year. While the loss of this amount of iron ore from the Lake Superior region is a serious matter and there can be no let-up in the efforts to move this vital material, the concern felt is being over-emphasized. There is no chance of making up the 8,000,000-ton deficit. Unless an unforeseen catastrophe overtakes shipping, the ore that will be carried downlake by the end of the current shipping season will, if meted out carefully, be sufficient to meet the needs of the steel industry.

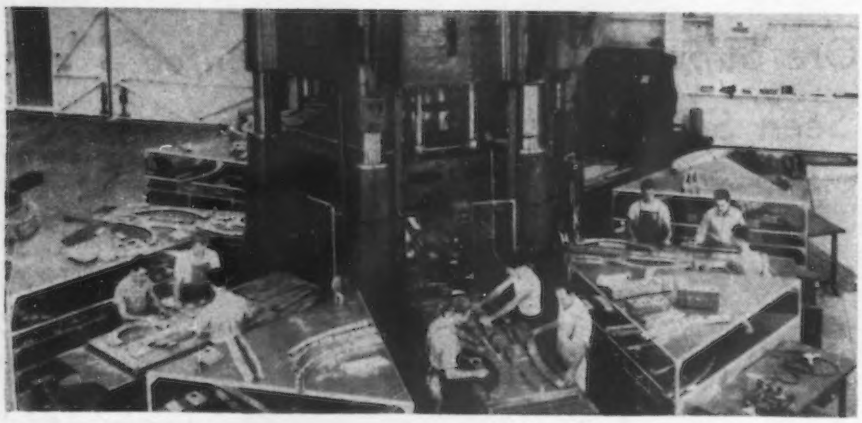
The possibility that may bring iron making operations up short before the opening of the 1944 lake shipping season is in the "maldistribution" of ore supplies among users. It is possible that some producers may have the bulk of the ore and others may be without ore. However, because of the cooperation between furnace operators, shippers, and carriers, this possibility has been foreseen. The quota system of ore distribution will stave off a slackening of pig iron production. By voluntary agreement, each consumer has been allotted a quota of ore that will carry operations through to the last week in May, 1944. Shipments will continue to such a consumer until the projected quota is filled, and then, regardless of ownership of boats, other consumers will receive ore until their quotas are filled. In this manner, it is expected that before the close of shipping this year each ore user will have on hand sufficient ore to carry through until the opening of lake shipping in 1944.

To bear out the statements that there will be sufficient iron ore to maintain capacity operations of blast furnaces and steel plants, it is necessary to project the figures of shipments, stocks, and consumption through to the end of May, 1944. Shipments this year will total at least 86,500,000 gross tons, as against last year's shipments of 92,000,000 tons. Ore stocks by the end of November, 1943, when the peak is usually reached, will be some 3,000,000 tons less than last year's 53,703,458 tons. With this 50,000,000 tons on hand and no more shipments for, at the outside, six months, the stocks will have to supply all existing needs.

Based on the 31-day period of greatest ore consumption, when about 7,500,000 tons of ore were consumed by blast furnaces and open hearths in the United States and Canada, this 50,000,000 ton stock could stand a drain of 7,500,000 tons a month for six months, carrying mills through from Nov. 30 to June 1, and still have a reserve of 5,000,000 tons.

It can be pointed out, of course, that 5,000,000 tons is not much of a reserve, but it must be realized that there will be none to be wasted. Furthermore, observers state that failure of the coming scrap drive can throw a heavier burden on iron ore. This factor, of course, must be taken into consideration, but in spite of the success or failure of the scrap drive, actual consumption could not increase greatly because blast furnace production could not be upped very much. Rather than hinge on available ore supplies, the maintenance of peak operation in steel mills depends more on scrap and coal supplies being adequate. Steel production can be increased by heavy scrap returns, but pig iron production is limited to blast furnace capacities, with operations now at near-peak.

| | 1935 $ | 1936 $ | 1937 $ | 1938 $ |
|---|---|---|---|---|
| Iron Ore (Tons) | 686,857 | 764,282 | 751,182 | 925,435 |
| Ingots, pigs, bloom, billets | 674,622 | 474,392 | 411,028 | 773,433 |
| Castings and forgings | 1,824,155 | 1,818,245 | 1,557,108 | 2,617,256 |
| Rolling mill products | 9,917,874 | 11,851,580 | 17,599,625 | 24,123,771 |
| Tubes, pipe and fittings | 939,982 | 1,058,793 | 1,273,788 | 1,782,933 |
| Wire | 370,020 | 278,741 | 354,759 | 788,461 |
| Chains | 172,734 | 258,668 | 273,706 | 385,847 |
| Engines, boilers (all types) | 7,105,113 | 7,272,560 | 7,502,600 | 9,093,457 |
| Farm implements, machinery | 3,341,370 | 5,712,752 | 10,141,308 | 18,181,100 |
| Hardware, cutlery | 1,117,330 | 1,155,711 | 1,119,692 | 1,178,331 |
| Machinery (except agricultural) | 15,808,013 | 18,562,224 | 27,403,682 | 42,667,842 |
| Stamped and coated products | 887,657 | 949,891 | 1,243,829 | 1,405,360 |
| Tools, hand implements | 835,631 | 960,631 | 1,393,674 | 1,658,606 |
| Vehicles (automobiles, etc.) | 24,895,261 | 26,785,889 | 37,745,908 | 45,817,383 |
| Other iron and steel products | 4,149,729 | 4,761,729 | 5,922,620 | 7,881,130 |
| Total iron and steel imports from United States | 77,477,564 | 88,428,437 | 121,742,147 | 170,603,311 |
| Total from all countries | 100,056,145 | 114,253,717 | 150,239,129 | 209,236,711 |



*Courtesy E. W. Bliss Co.*

# PRESSED METAL

## . . . A Speed-Up Factor in Ordnance

• • • **The Army Ordnance** Department looks with an appreciative eye upon the advances of both the steel industry and the pressed metal industry. Many developments have come out of the stamping industry, according to the records of the Pressed Metal Institute, while steel producers have cooperated fully to provide the necessary types of steel.

An outstanding example of development came with the announcement a few months ago of aluminized steel sheets by American Rolling Mill Co. One of its applications has been for fire walls in aircraft cockpits where, in some cases, it has replaced stainless 18-8. When buffed, aluminized steel has a heat reflectivity of 75 to 85 per cent in the temperature range of 600 to 1000 deg. F. It does not discolor up to approximately 1000 deg. F., and has the necessary physical properties for this service. It also has corrosion resistance.

Helping illustrate the role of the pressed metal industry, is the announcement of Willys-Overland that of 8900 parts going into the ¼-ton 4 x 4 military truck, 1336 are stampings. A suspension guide fitting formerly requiring three individually machined forgings welded together now is produced by means of inexpensive stampings hydrogen copper welded. The cost reduction on this part alone is reported to have dropped from $2.35 per unit to 68c.

**Old style ammunition** box hardware has been replaced by a newly designed type of pressed metal with a reported saving of weight. Box production is reported to have been increased up to 33 per cent with 60 per cent less personnel. A notching operation in box fabrication was also saved and total cost of hardware reduced.

Other advances which are cited include a grenade box, formerly made of welded tubing but now made of pressed metal. The industry also produces smoke cannisters for 105 mm. shells, incendiary bomb bodies, detonators and carbine trigger housings.

The carbine trigger housing was converted to a combination of hydrogen welded stampings with only minor machining requirements. On a single order of these trigger housings, 720,000 man hours were saved plus the release of much machinery.

Another stamper is making millions of junction and switch boxes, which were formerly machined aluminum castings, and 75 mm. smoke projectiles.

Pressed steel pipe unions are now being made and pressed steel handles for machine tools which are lighter than the better known cast iron handles. Twenty mm. steel cartridge cases are also being produced on presses and many of the parts for the new Navy fire fighting equipment used against butadiene fires.

Fuse noses, once machined from brass are now pressed complete without any machining operations. Several types of fuse gears and springs are now stampings finished completely on the press. Another fuse part, a laminated plate, is stamped to accurate size and shape, anchored together with pins, punched with necessary holes and given a mirror finish—all on the press. Only remaining operation is the tapping of three holes.

All these records of advancement and conversion add up to time, money and material savings. Interesting figures on conservation of critical materials in 1943, estimated by Army Ordnance officials and including the savings rendered by pressed metal use, total to enough aluminum saved to build 25,500 fighter planes, enough copper for three billion rounds of .50 caliber ammunition, steel for 31,000 railroad oil tankers, 64 million pounds of nickel, over four million pounds of molybdenum, 17½ million pounds of chromium and over five milion pounds of tin.

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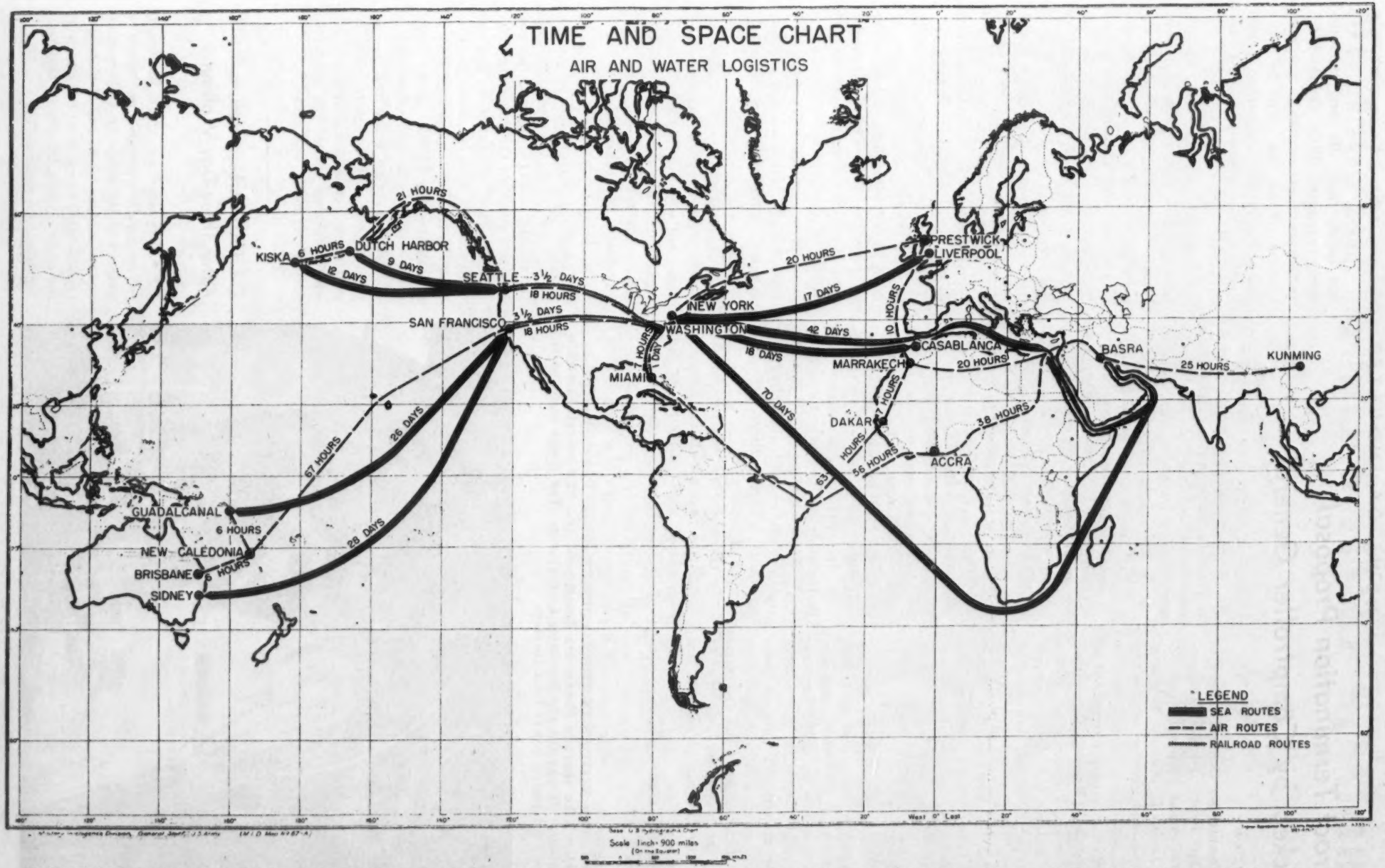
# Bethlehem Shipyard Vacation Rule Expected to Set Policy for Steel Workers

*Washington*

• • • **Overruling objections** of the Bethlehem Steel Co., the War Labor Board Shipbuilding Commission, with industry members dissenting, last Thursday held that vacation practice in one industry is not necessarily compelling upon another industry, even when ownership of large plants in the two industries rests in the same company. The Bethlehem Steel Co. objected to a liberalized vacation plan order by the Commission for the company's eight Atlantic Coast yards on the ground of possible repercussions in the steel plant union contracts in the steel industry generally. Forecasts have been made that the decision of the Commission will have the effect of establishing a liberalized vacation plan in the entire steel industry.

**The liberalized** plan ordered for Bethlehem's Atlantic shipyards is similar to that for the Federal Shipbuilding & Drydock Co., yard recently announced. The plan grants a week's vacation after a year of service and two weeks after five years. The workers in the shipyards are represented by CIO's International Union of Marine and Shipbuilding Workers. The old contract which expired June 23, 1943, provided for one week's vacation after three years' service and two weeks' vacation after 15 years.




**MARSHALL DEPICTS SHIPPING PROBLEM:** In the very interesting biennial report made public recently by Gen. George C. Marshall, Chief of Staff, this map shows the time and space problems faced by United States military authorities. Marshall pointed out that "the tremendous amount of shipping required for a modern army is not generally understood. For instance, in computing initial shipping requirements an average of six measurement tons of cargo space per man is required. Maintenance requirements average one measurement ton per month."

# Contract Termination Proposal Attacked by Comptroller General

*Washington*

• • • **Comptroller General** Linsay C. Warren last Friday attacked the contract termination proposal made by Senator James E. Murray, Democrat of Montana, and likewise all the termination regulations issued by the war agencies in a report requested by the Senate Small Business Committee.

The General Accounting Office chief's objections will cause a sweeping revision of the bill now pending before the House Military Affairs Committee as well as the Senate measure, Congressional observers predict. Naturally, the regulations put out by the Army and WPB will be greatly modified when Congress finally acts.

The major objection to the Murray proposal and to the regulations is that a vast number of contractors and subcontractors would be given unprecedented rights to demand and receive from the government advance payments of money without providing that the departments shall determine whether the payments are due, or whether the government's rights are protected.

**Because of a** tendency toward "liberality" of Army contracting officers, Mr. Warren doubted it would be wise to continue to permit the contracting officers to continue to settle terminated contracts, under present rules. He said that GAO's experience was that the contracting officers have in the past permitted thousands of overpayments to contractors operating under cost-plus contracts.

Said Mr. Warren: "This liberal attitude evinced by contracting officers and other administrative representatives of the Government has convinced me, that . . . the contracting officer's determinations of the amounts to be paid will be based largely on the contractors' representations as to the amounts owing, and that no sufficient effort will be made, in the vast majority of cases to verify or scrutinize the self-serving statement of costs furnished by contractors. Moreover, I am convinced that the contracting officers will allow improper payments which, perhaps, will total milions of dollars."

Furthermore, Mr. Warren told the Committee that all claims should be coordinated and considered by GAO which has the only authority under law to do this. He said that the Army regulation, PR-15, and the WPB uniform termination clauses give contracting officers the right to settle and adjust claims against the United States in derogation of GAO's lawful right.

**PR-15,** the proposed WPB regulation and the Murray proposal were criticised because they obligated the government to pay monies to contractors merely upon their certification that the money was due.

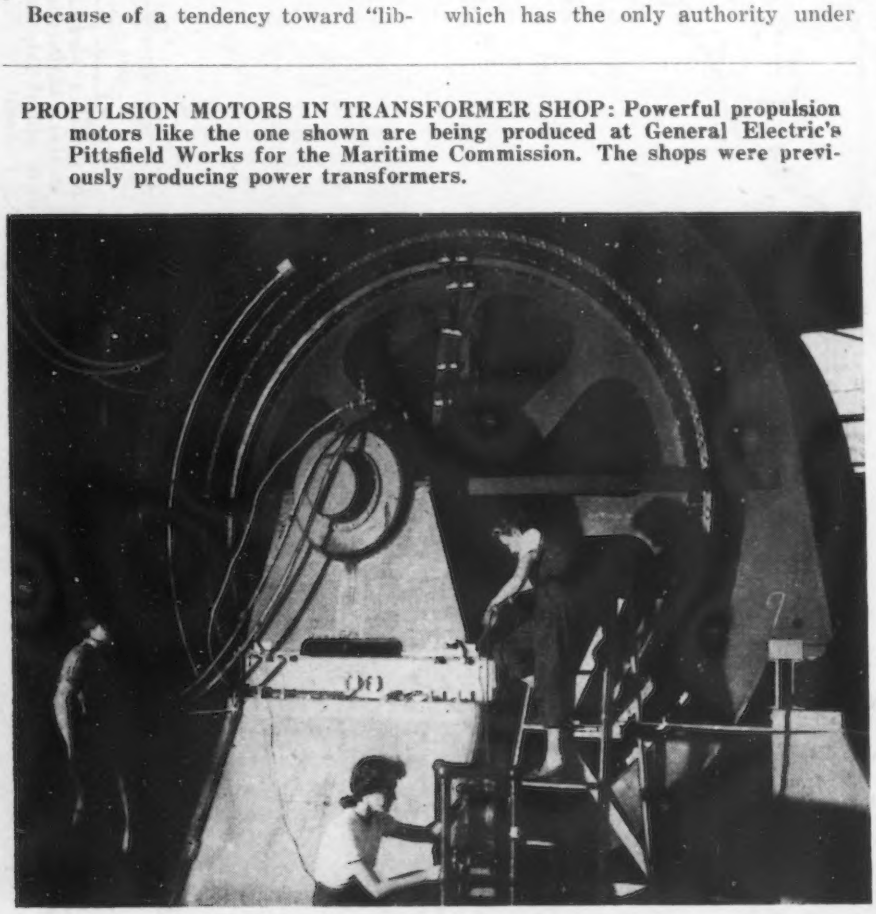
While GAO raises no objection to the principle of helping war contractors reconvert, its recommendation is that any law should provide for examination of each contractor's need for assistance, and his financial ability to repay any loan which is made.

The Murray proposal was criticised because it will obligate the government to expend billions of dollars, but an indefinite sum, without requiring that the government examine the merits of the contractor's claim. It does not require that there be a legal basis for the claim, or that payment be made on the basis of evidence submitted.

"Undoubtedly a large number of demands would be filed under the proposed bill which would not have any legal foundation, and carrying no obligation for the government to make payment," the report says.

**The point** is also made that under the proposed Murray bill subcontractors would have the right to claim termination charges against the government and that the government has no contractual obligation to the subcontractors. Also, if there were no central authority to pass on claims, or no examination by the agency itself, there would be a high probability of overlapping claims being filed by contractors and subcontractors. The report recommends that contractors and subcontractors claims be reconciled before payments are made.

**PROPULSION MOTORS IN TRANSFORMER SHOP: Powerful propulsion motors like the one shown are being produced at General Electric's Pittsfield Works for the Maritime Commission. The shops were previously producing power transformers.**



## C-I Tin Workers Return After Three-Day Walkout

*Chicago*

• • • **Persuaded by** union leaders to follow regular grievance procedure requested by the company, 2000 workers at the Gary, Ind., tin mill of Carnegie-Illinois Steel Corp. went back to work the night of Sept. 22 after a three-day "spontaneous walkout."

# MAKING THE WORLD'S FINEST STANDARDS

1899 • 1943

● SHOP WHERE HJALMER ELLSTROM DEVELOPED THE ORIGINAL GAGE BLOCK.

● PLANT WHERE CHROMIUM PLATED GAGE BLOCKS ORIGINATED (the only major improvement since their origination).

## A Family Tradition

The manufacture of gage blocks has become a family tradition with the Ellstrom family. Elmer Ellstrom, the founder of the Dearborn Gage Company, worked as an apprentice to his father, Hjalmer Ellstrom when the latter worked on the development of the gage block. This apprenticeship was served from 1899 to 1904 at which time his father worked in the tool room of the great Swedish Arsenal in Eskilstuna Fagersta where the finest grade of steel known is made. With this steel at his disposal, the elder Ellstrom contributed to the development of the steel analysis which permits the stability required in gage blocks.

Together with this development a process of seasoning steel was discovered as well as an instrument for checking dimensions in degrees of accuracy. So effective were these discoveries that to this day they have no equal in reliability and precision.

After having spent his early years in the very birthplace of precision measurement, Elmer Ellstrom desired more experience in methods used in the steel-working industry and in 1904 came to the United States where he found employment with large manufacturers in this country, such as Westinghouse, Mesta Machine Company, Joseph Bullard Company and the Martin Bomber Company.

With this wide experience as a background, Elmer Ellstrom began his own company in 1936 and with the assistance of his three sons, Ralph, Olof and Elmer, he has built the Dearborn Gage Company into a recognized leader in its field.

Yes, the manufacture of gage blocks is truly "a family tradition" with the Ellstrom family and it is undoubtedly the reason why Dearborn Chromium Plated Gage Blocks are known for their superiority throughout the world.

**DEARBORN GAGE COMPANY** 22038 BEECH STREET DEARBORN, MICHIGAN

*Originators of Chromium Plated Gage Blocks*

## Instructions Amended On CMP Bills of Materials

*Washington*

• • • **WPB has issued the** following changes in procedure for filing bills of materials:

First: Material requirements for B products are to be furnished to the Claimant agencies by WPB industry divisions; prime and secondary consumers will not include material requirements of B products in their bills of materials.

Second: Rail and track accessories such as gage rods, mine ties, clip belts, rail clips and nuts are reclassified from controlled materials to B products in the fourth quarter of 1943 and subsequent quarters.

Third: Frogs, crossings, switches, switch stands, rail anchors, rail braces, guard rails and guard rails clamps are reclassified from controlled materials to B products for the first quarter of 1944 and subsequent quarters.

Fourth: Wire shoe nails, cut nails from tack plate, boat spikes, dock spikes, and wharf spikes are reclassified as B products beginning with the fourth quarter 1943 and for subsequent quarters.

## July Scrap Stocks Show 4% Decrease

*Washington*

• • • **Domestic stocks** of iron and steel scrap at consumers', suppliers', and producers' plants at the end of July, 1943, approximated 6,860,000 gross tons, representing a decrease of 1 per cent from the 6,916,000 tons reported on June 30, according to a statement released by the Bureau of Mines. This decline was occasioned by a decrease of 4 per cent in stocks held by suppliers and producers, while consumers' stocks remained approximately the same. Thus while suppliers' and producers' stocks on July 31 amounted to 1,189,000 tons, compared with 1,233,000 tons at the end of June, consumers' stocks were 5,671,000 tons and 5,683,-

## COMING EVENTS

Sept. 30 to Oct. 2—Society of Automotive Engineers, Los Angeles.
Oct. 1, 2—Electric Steel Furnace Committee, AIME, Pittsburgh.
Oct. 5, 6—Gray Iron Founders' Society, Cincinnati.
Oct. 5, 6, 7—National Safety Congress, Chicago.
Oct. 11, 12—American Society of Tool Engineers, Indianapolis.
Oct. 13 to 16—The Electrochemical Society, Inc., New York.
Oct. 14, 15—American Machine Tool Distributors' Association, Montebello, P. Q., Canada.
Oct. 18 to 22—National Metal Congress and Exposition, Chicago.
Nov. 10, 11—Industrial Hygiene Foundation, Pittsburgh.

•

## Priority Assistance Granted for Casing, Tubing

*Washington*

• • • **Petroleum Administrative** Order 11 has been amended to permit oil producers in Illinois and parts of Indiana and Kentucky to use priorities assistance in obtaining casing and tubing to be used in drilling and completing wells. Formerly such wells could be drilled only if casing and tubing were from stocks on hand or were acquired without the use of priorities assistance. Priorities assistance has always been permissible for obtaining materials other than casing and tubing. This provision remains unchanged.

The amended order—Supplementary Order No. S to Petroleum Administrative Order No. 11—has replaced the provisions of the former WPB M-68-5.

## Small Order Procedure Clarified for Brass Mills

*Washington*

• • • **Brass mills may ship** orders calling for less than 200 lb. of controlled material from overruns of orders fo rsimilar material and they may combine the production of small orders calling for delivery in separate months, as a result of Direction 32 to CMP Regulation 1, WPB announced on Monday.

Any items on an authorized controlled material order calling for delivery of less than the minimum mill quantity of 200 lb. of any one brass mill product may be produced ahead of its regular place on the production schedule if (1) it is not in finished mill stock and (2) if such production will not materially delay production of previously accepted authorized controlled material orders. Any order produced ahead of its regular time under the Direction may be delivered by the brass mill at any time. If delivered prior to the month in which it was requested it must be delivered with the customer's consent.

Delivery of any item on an authorized controlled material order calling for less than 200 lb. of any one brass mill product may be made from finished stock at any time after receipt of the order but only with the customer's consent if it is made prior to the month in which delivery was requested.

If an authorized controlled material order included more than one item calling for the same brass mill product, or if a customer places separate orders containing items calling for the same brass mill product, such items should be considered as one and consequently, not applicable to aggregate quantities in excess of 200 lb. Deliveries made under the direction may be accepted by customers, even if it would not be permitted under CMP Regulation 2, providing inventory limitations.

•

## Labor Cost Exclusions Clarified in MRO Quotas

*Washington*

• • • **In computing quotas** for maintenance, repair and operating supplies under CMP Regulation 5, and in charging purchases against these quotas, manufacturers are permitted to exclude the cost of the labor involved, in carrying on such operations, WPB announced last Saturday in issuing Direction 13 to the regulation. However, if labor costs are excluded with respect to MRO purchases they must be excluded with respect to the quota computation.

It was also pointed out that items included in Lists A and B of Priorities Regulation 3 may be excluded from computation of the quota and purchases against it, but these items must be excluded from the computation of the quota and the charges against the quota.

The Direction requires that MRO quotas must be computed and that records of the computation and supporting work sheets must be kept for at least two years after the last purchase of MRO items under the regulation. Persons purchasing under the regulation must also maintain a record of expenditures for MRO items for not less than two years.

## *August Blast Furnace Production—Net Tons*

| | PIG IRON | | FERRO-MANGANESE AND SPIEGEL | | TOTAL | | |
|---|---|---|---|---|---|---|---|
| | Current Month | Year to Date | Current Month | Year to Date | Current Month | Year to Date | Percent of Capacity Current Month |
| DISTRIBUTION BY DISTRICTS: | | | | | | | |
| Eastern | 995,780 | 7,568,052 | 14,124 | 156,658 | 1,009,904 | 7,724,710 | 92.4 |
| Pittsburgh-Youngstown | 2,204,200 | 16,624,340 | 15,480 | 145,510 | 2,219,680 | 16,769,850 | 99.7 |
| Cleveland-Detroit | 528,236 | 4,081,952 | ..... | ..... | 528,236 | 4,081,952 | 101.5 |
| Chicago | 1,139,354 | 8,729,807 | ..... | ..... | 1,139,354 | 8,729,807 | 102.3 |
| Southern | 315,997 | 2,629,610 | 16,194 | 131,433 | 332,191 | 2,761,043 | 88.3 |
| Western | 86,268 | 608,318 | ..... | 6,141 | 86,268 | 614,459 | 89.5 |
| TOTAL | 5,269,835 | 40,242,079 | 45,798 | 439,742 | 5,315,633 | 40,681,821 | 98.0 |

During 1942 the companies included above represented 99.8 per cent of the total blast furnace production. From American Iron and Steel Institute.

HILLS-McCANNA
MAGNESIUM ALLOY
SAND CASTINGS
Enter into the production
of the Famous
Boeing Flying Fortress
Our foundry is at present completely absorbed in the production of aircraft parts for many of the nation's plane and engine builders, comprising throttle bodies for carburetors, brake and wheel assemblies, parts for engines, generators, gun turrets, aerial cameras, etc.
Hills-McCanna Magnesium Alloy Sand Castings will play an important role after victory, too — when their light-weight and great strength will be directed to the peace-time products of Industry.
We shall be pleased to discuss with you your post-war plans and products.
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3017 North Western Avenue, Chicago, Illinois
PROPORTIONING PUMPS • AIR & WATER VALVES • CHEMICAL VALVES
MARINE VALVES • FORCE-FEED LUBRICATORS • DOWMETAL CASTINGS
FOUNDERS OF NON-FERROUS ALLOYS SINCE 1870

HELP AVOID PRODUCTION TROUBLES DUE TO RUST

By Using

SPECIALIZED OAKITE MATERIALS

When rusting occurs, trouble begins . . . rejects, production delays, lowered output, loss of critical materials, waste of urgently needed time and manpower . . . ALL are the result of this saboteur to smooth-flowing production.

Rusting of steel shells, torpedo casings and parts, bombs and other war supplies frequently CAN be avoided by using specially designed Oakite cleaning materials, particularly where surfaces must be rust-free before painting or lacquering. Where rust has caused rejects, work can be reclaimed with Oakite rust-removing materials expressly developed for this purpose.

Personal Service FREE!

Conveniently located nearby, our Technical Service Representative will gladly give you the benefit of his wide experience in successfully helping other plants avoid production troubles due to rust. Write today to have him call! No obligation, of course.

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*Technical Service Representatives Located in All Principal Cities of the United States and Canada*

OAKITE Buy Bonds for Victory
*Specialized cleaning*
MATERIALS & METHODS FOR EVERY CLEANING REQUIREMENT



# *WPB Decentralization Not to Move Steel Division; New Procedure Outlined*

***Washington***

• • • **The WPB Steel Division** and other WPB divisions now located in Washington are not slated for moves to the field in WPB's present decentralization plans, H. G. Batcheller, Operations Vice-Chairman told THE IRON AGE last week.

Reports that whole divisions would be lifted from Washington have caused a fine case of jitters among employees who for one reason or another preferred to remain here. WPB officials have had to reassure employees that no such moves are contemplated to persuade them not to transfer to other agencies.

WPB's decentralization is one of paper work. The agency says that a possible 33 per cent reduction of necessary travel by business men to and from war-jammed Washington will result through a 25 to 40 per cent reduction of paper flow to the capital.

To maintain adequate liaison between WPB and its 13 regional offices a WPB Operations Council composed of the various regional chairmen has been created. Mr. Batcheller will meet with the council every two weeks to iron out organizational details.

**Co-incidentally,** the position of Deputy Vice Chairman for Field Operations was abolished, since the regional chairmen will work directly with the Operations Council. A new Field Service Office, under Harcourt Amory will channel information and services to the regional and district offices. Mr. Amory was formerly assistant to the vice-chairman for field operations.

Under the new arrangements, field offices will have increased authority to process PD-1A applications, industrial projects under $10,000; Emergency Assistance Applications (PD-333) and appeals under WPB orders.

At the same time, Mr. Batcheller revealed a reduction in CMP paper work which will have the result after March 30, 1944, of eliminating two out of every three CMP-4B applications, with authorizations made on an annual basis.

**The action to** reduce CMP paper work was taken after a study of the 4-B applications for carbon steel, received quarterly revealed that 80 per cent of the applications represented a demand for only 5 per cent of the carbon steel supply. Studies being made of copper and aluminum 4-B's indicate that much the same picture exists.

The change in regional procedure is as follows:

At present, field processing is limited to PD-1A applications of less than $500. This authority is now increased to applications up to a value of $1,000 and after 90 days, the authority will extend to applications of a value of $2,500.

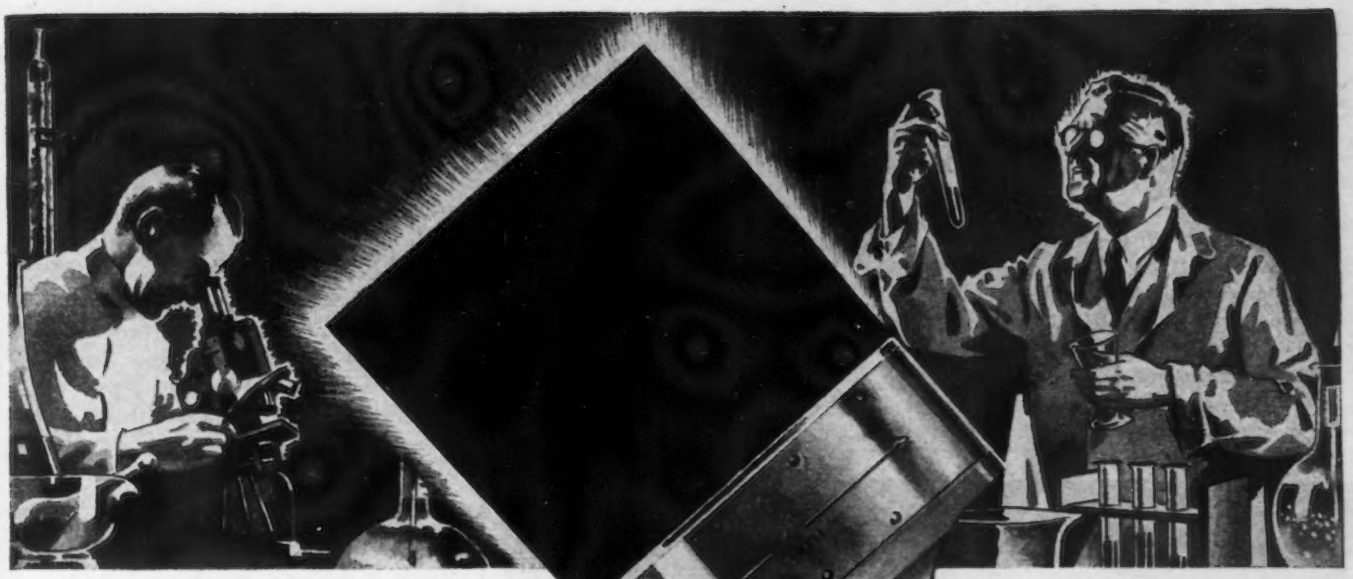
On Oct. 15, the field offices are scheduled to begin processing industrial project applications up to $10,000 (excepting certain types of projects) and this authority is to be increased to cases of $25,000 in value or less beginning Jan. 15, 1944.

The field offices now process PD-333s (emergency assistance application) up to a value of $500. This is to be increased to $1,000 within 30 days, and to $2,500 within 60 days. The authority to grant emergency AAA ratings, however, will remain with the Washington offices for the time being.

At the present time, the field offices handle appeals under 60 WPB "L" and "M" orders, and are permitted only to deny such appeals, or to recommend approval; they are not permitted to make outright grants on appeals. Within the next few weeks, 136 additional orders will be referred to the field, with action limited as above on 66 orders and limited to recommendations for denial or approval on the other 70 orders.

After the 136 orders have been in the field for 60 days, regional offices will be permitted to deny appeals in all cases, and to grant appeals in certain types of cases.

**PLENTY OF METAL HERE: A few more medals and Tojo will have the equivalent of a bullet proof vest. He is shown here attending Admiral Yamamoto's funeral, which probably reminded him that his own days are numbered.**



## After Years of Laboratory Work and Extensive Testing "Pittsburgh" Now Offers

# NEOCETA*

# SYNTHETIC BRISTLE BRUSHES

### Comparable in Quality and Performance to Brushes Made with Pure Natural Bristle

"Pittsburgh" scientists started their experiments two years before Pearl Harbor. They had instructions to continue their research work until they had developed synthetic bristle brushes which would be as efficient in performance as those made with the best natural bristles.

After three years, they have succeeded in meeting the specifications. As a result, "Pittsburgh" now offers America's first full line of synthetic bristle brushes. Repeated tests prove that these Neoceta brushes compare favorably with any pre-war brush you have ever used.

### *Everything You Ask for in A Paint Brush!*

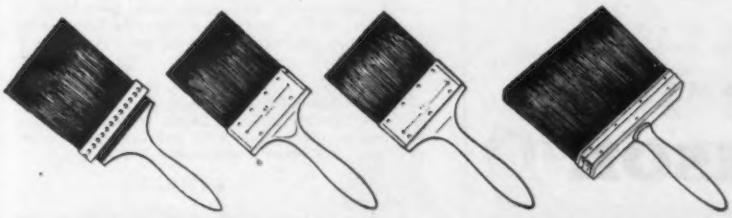
Neoceta brushes are highly practical and workable. Examine this bristle under a microscope and you will find that its taper is very similar to a natural bristle's. This allows paint to flow evenly and brush on smoothly. Neoceta brushes hold as much—*or more*—paint as pure bristle brushes and rival them in durability, spreading ability and the character of the film they produce. Here, in short, is a product that stands squarely on its own merits.

### *Availability*

Winning the war comes first! Brushes of Neoceta are now available to the Army, Navy, or contractors for war materials for the Armed Services.

*Bristle brushes, made and distributed in accordance with W. P. B. regulations, are also still available, with the necessary priority, through "Pittsburgh" branches everywhere.*

**Trade Mark Reg. U. S. Patent Office No. 397,100*



## PITTSBURGH PLATE GLASS COMPANY

NEOCETA brushes are manufactured by the creators of famous *Gold Stripe* brushes

# Doxsey Sees CMP Successful for Warehouses; Cites Sheet and Plate Shortage

*Cleveland*

• • • Success of the Controlled Materials Plan, from the standpoint of steel warehouse distributors, is clearly apparent as the first three-month period of the full operation of the plan nears an end. This plan permits warehouses to sell steel under clearly stipulated conditions. It provides for the replacement of the steel sold from stock in accordance with these warehouse regulations, according to Walter S. Doxey, president of the American Steel Warehouse Association.

During July, the first month for which these CMP statistics are available, figures submitted by our members show that for every 98 tons of general steel products delivered from warehouse stocks, 100 tons were received into inventories from all sources —86 tons came from scheduled rollings, 7.5 tons from other than scheduled rollings and 6.5 tons from persons other than producers.

Because of the accelerated shipbuilding program which has resulted in an over-all shortage of plates for all critical war purposes, it has not been possible to place upon the plate mills warehouse load directives equivalent to warehouse sales. The warehouse load directives for plates may range anywhere from 60 to 75 per cent of the total warehouse base tonnage for plates. For example, our figures for the month of July show that for every 100 tons of plates received by warehouses, 64 tons came from scheduled rollings, 29 tons came from other than scheduled rollings and 7 tons from persons other than producers. Total receipts of plates,

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METAL PRODUCTS CLEANING & FINISHING EQUIPMENT

## Priority Changes

**E-5a**—Amended order, governing gages and precision measuring hand tools, clarifies the scope of the original order. (9-25-43)

•

**L-29**—Amended order excludes illuminated exit signs from coverage of that order. (9-22-43)

•

**L-106**—Amended order eases somewhat restrictions on the use of copper and copper base alloys in certain automotive parts. (9-22-43)

•

**L-114**—Amended order eases restrictions on the use of certain critical materials in the manufacture of safety equipment. (9-20-43)

•

**L-190**—Series of schedules to order sets up standards and sizes for scales and balances which can be produced by wartime industry. (9-24-43)

•

**L-199**—Amended order gives simplification and standardization of porcelain lined range boilers and hot water storage tanks. (9-23-43)

•

**L-211**—Amended order corrects the title of the original order to read "Casing, Grade J-55." Amendment to Sched. 9 strikes out the provision for seamless pipe casing and in its place inserts the phrase lap-weld. (9-25-43)

•

**L-267**—Order brings production and distribution of photographic and projection equipment, accessories and parts now permitted to be made, under restrictive controls because of the limited amounts of scarce materials available. (9-20-43)

•

**L-223**—Amended order permits the hard facing of agricultural tillage machinery and equipment on a par with mining, petroleum, railroad and other industries. (9-25-43)

•

**L-288**—Amended order adds an item to the Appendix listing pipe fittings which can be manufactured under the order. (9-22-43)

# W·A·B remote control systems

## can help you solve some production and employee problems

Yesterday the main concern of Industry was fitting the employee to the job. Today's big task is fitting the job to the employee. W·A·B Remote Control Systems can often help, by simplifying, lightening, and "fool-proofing" the work.

Where some sequence or cycle of machine operations is involved, the entire series can be governed from a control stand, by the movement of a small handle. Any need for long training and special skill is thus eliminated. Positive and dependable interlocks can be easily included, to prevent damage to the equipment because of operator's errors. And the handle can be moved by a touch of a finger, so that muscular strength is not essential and fatigue is lessened.

If your product is such that an operator is required, the installation of W·A·B Controls may help your customers to solve *their* employee problems. If you are using increasing numbers of untrained employees in your plant or factory, the installation of W·A·B Controls may help you to solve your own. Frequently "off the shelf" W·A·B devices are all that are needed to do the job. One of our representatives will be glad to talk things over with you. Write, wire or phone.

Westinghouse Air Brake Company

INDUSTRIAL DIVISION

*General Offices: Wilmerding, Pa.*

74 Years of Pneumatic Control Experience

**W·A·B**

PNEUMATIC
PNEUMATIC-ELECTRIC
PNEUMATIC-HYDRAULIC

**remote control systems**

however, were 97 per cent of sales by warehouses in the month of July.

The conversion of so many of our continuous mills for the production of shipbuilding plates has made heavy inroads upon facilities for the production of hot-rolled and cold-finished sheets. Recently, demands of the armed services for products made of sheets has been exceptionally heavy. Unfortunately, therefore, the supply of hot-rolled and cold-finished sheets is also limited. For the time being, it is likely that warehouse load directives for these products will fall short of total warehouse sales.

## WPB Issues New Questionnaires, Reports

*Washington*

• • • **The following new** report, application and questionnaire forms have been issued during the past week by the WPB:

**WPB-554**—Receipts of aluminum scrap and shipments of aluminum scrap and aluminum ingot.
**WPB-2958**—Brass and bronze foundry: Application for copper, copper-base alloy ingot and scrap.
**WPB-2757**—Permission to sell steel reported to War Production Board, c/o Steel Recovery Corporation.
**WPB-1888**—Producer's semi-monthly progress report on tin mill products. Orders and Shipments under O.E.W. allotment.
**WPB-2934**—Application for authorization to deliver or receive brass mill products and copper-base alloy slabs or billets for further processing.
**WPB-1727**—Cold drawn carbon shell steel; Requirements.
**WPB-3197**—Merchant trade steel products: Producer's statement of warehouse base tonnage.
**WPB-2022**—Zinc dust allocation certificate.
**WPB-2944**—Cobalt for metallic and nonmetallic uses: Application and allocation.
**WPB-765**—Molybdenum: Application and allocation.
**WPB-2913**—Vanadium: Application for allocation of.
**WPB-2868**—Tungsten: Application for allocation for metallic and nonmetallic uses.
**WPB-1770**—Ferro-alloys: Detailed request for permission to use.
**WPB-3222**—Attachment third axle: Production report.
**WPB-1201**—Hot rolled carbon shell steel: Forger's requirements.
**WPB-2251**—Aluminum forge shop: Monthly delivery schedule.
**WPB-3183**—Reciprocating compressors: Scheduling and production record card.
**WPB-2873**—Nickel chemicals: Customer's application for deliveries pursuant to Order M-6-a amended.
**WPB-2456**—Producer's weekly report on export steel (other than Canada and Lend-Lease) awaiting ODT shipping permit.
**WPB-2633**—Steel producer's monthly report of shipments and past due orders. Controlled carbon steel (including wrought iron) and alloy steel products excluding steel castings.

## Warehouses Permitted To Replace Farm Deliveries

*Washington*

• • • **Direction** 2 to General Preference Order M-21-b-2 was issued last Thursday by WPB to permit steel distributers to replace in their stocks merchant trade products delivered without certificate or endorsement to farmers between April 1 and Dec. 31, 1943. WPB said that it was found that many distributers had in good faith made deliveries to farmers without requiring a certificate.

## Additional CMP Developments

• Dir. 6 to Reg. 1 rules that producers' exchange of steel in controlled material form by a producer or distributor to be physically delivered to the plant of another producer for resale must be accompanied with the symbol endorsement PX, together with the statement that the shipment will be resold in the form in which it is received. Such an order becomes an authorized controlled materials order and reported under the symbol PX.

•

• Dir. 32 to Reg. 1 permits brass mills to ship orders calling for less than 200 lb. of controlled material from overruns of orders for similar material and they may combine the production of small orders calling for delivery in separate months. (Release No. WPB-4304)

•

• Amend. 1 to Dir. 30 to Reg. 1 makes it clear that the direction is addressed to brass mills. (Release No. WPB-4300)

•

• Dir. 13 to Reg. 5 permits manufacturers to exclude the cost of the labor involved in computing quotas for MRO supplies under Reg. 5, and in charging purchases against these quotas. However, if labor costs are excluded with respect to MRO purchases they must be excluded with respect to the quota computation. (Release No. WPB-4303)

## Labor Again Condemns Priority Hiring

*Buffalo*

• • • **The Buffalo-Niagara** area controlled referral hiring plan took a new shellacking the last week from irate labor.

The Buffalo Federation of Labor, representing 70,000 dues-paying workers, mostly skilled, adopted a resolution condemning the plan in its present form as "unworkable." President Robert Smith said the plan was "interfering with war production and forcing our men to walk the streets because they refuse to be referred to jobs paying less than they have been receiving."

The referral plan, which has also been ordered into effect on the West Coast, compels all males seeking work to apply first at a United States Employment Service office. Applicants have no choice of jobs. They go where they are referred or they don't go.

**The Hewitt Rubber** Co. local, Buffalo, of the United Rubber Workers, also condemned the plan and succeeded in having a resolution blasting it adopted by the URW international convention in Toronto.

Hugh Thompson, regional CIO director in Buffalo, hit at the plan again in his annual report to CIO national headquarters in Washington. He called the hiring plan "labor servitude" and said the area manpower committee, of which he is a member, was so much "window dressing."

Meanwhile, the subcommittee of the area committee charged with drawing up amendments to the present hiring plan is scheduled to present its proposals to the full committee within a short time. While Mrs. Anna Rosenberg, regional director of the WMC, has agreed to some revision of the plan, it is not likely she will back down from her stand that there is nothing wrong in referring a worker to a job paying less than his old one if his services are needed in the interest of war production.

o o o

## War Workers Quitting for Peace-Time Jobs

*Buffalo*

• • • **The Buffalo-Niagara** manpower shortage is being made acute again by out of town workers quitting and going back to their homes to prepare to take up peacetime pursuits, according to findings of Maj. Ray D. Wells, occupational adviser for New York selective service. The exodus is being caused by excessive talk of an early "armistice" or "victory."

"Many women, who should stay at their jobs, are going back to their homes, too," the major said, "not alone because of domestic demands but simply because they hear all this talk about victories. They figure their efforts no longer are needed in the plants. I wonder what's going to happen when we get a couple of slaps in the face on the fighting fronts?"

One war worker, Maj. Wells said, told him he had quit to return to Pennsylvania to get his gasoline pumps painted in time for the "armistice." He had heard so much talk of peace he figured it was time to get his gas station in order. Maj. Wells said this situation could be multiplied many times.

Joseph D. Canty, area war manpower commission director, and Leo A. Sweeney, district superintendent of the USES, support Maj. Wells' findings.

### Women Quitting Jobs Ask No Referral

*Buffalo*

**• • • War plants in this area report scores of women are quitting their jobs and going back to the hearth and home. They don't even ask for releases so they can go to other plants. They just quit. There's a possibility this development had something to do with a 2.3 per cent shrinkage reported in local factory employment from July 15 to Aug. 15.**

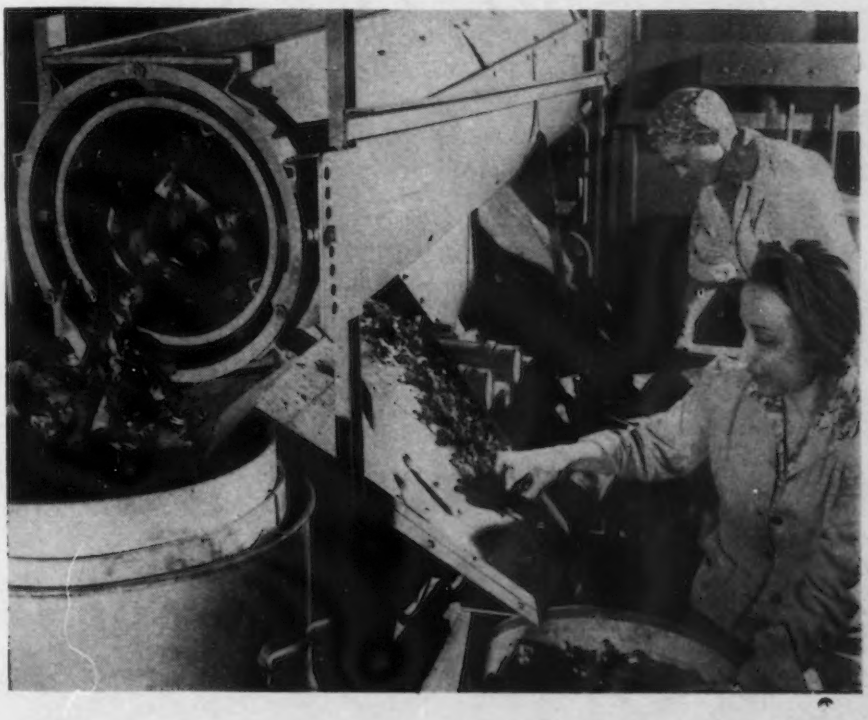
### Bell Aircraft Forced To End Third Shift Work

*Buffalo*

• • • **The third shift** at the Niagara Falls plant of Bell Aircraft Corporation has been discontinued because of a manpower shortage. Workers on the shift have been reassigned to the two other shifts. The company is not on the labor priorities list of the area war manpower committee.

A company spokesmen said increased production is expected from the two "full" shifts compared with the old three-shift system. Third shifters worked only 6½ hr. a night, but will work eight on their new assignments.

**MAGNETIC SORTER: Consolidated Vultee salvaged enough scrap in two weeks to build a basic trainer plane.**



# New CMP Rules on Steel Deliveries

*Washington*

• • • **Rules governing three types of deliveries of controlled material forms and shapes of steel have been established by an amendment to Direction No. 6 to CMP Regulation 1, the War Production Board announced.**

The procedure to be followed in each of the three cases follows:

1. Where steel in controlled material form is shipped by a producer or distributor to be delivered to the plant of a producer for resale, without further conversion, the order for such shipment must be endorsed with or accompanied by a certificate which (a) bears the symbol PX (producers exchange) and (b) states that the controlled materials covered will be resold in the form and shape in which received. The seller who receives such an order may, but is not required to, accept it. If he accepts it, he must consider it an authorized controlled material order. He must report it under the symbol PX on reports of orders and shipments.

**When resold,** the material must be reported by the purchasing producer on his report of shipments under the appropriate allotment symbol furnished by his customer. The material will not be considered a part of the purchasing producers production, and therefore may be disregarded in determining the tonnage of orders accepted under restrictions of CMP Regulation No. 1.

2. Where one producer of steel places an order with another producer for steel in controlled materials form which he intends to convert into other forms of controlled material for resale, shipment may be made only on the basis of (a) an allocation on Form GA-193 (formerly CMPL-182) or (b) an allotment issued under CMP Regulation No. 8 on form CMPL-150. It may not be placed on the basis of an authorized controlled material order received from a customer.

Such an order which is properly paced must be accepted if rolling capacity within 110 per cent of Production Directive or finished stock is available. A producer of this type of order must report it under the symbol FC (further conversion) on his report of orders and shipments.

When the material is resold by the purchasing producer, it must be reported under the appropriate allotment symbol furnished by his customer. The material in this case will be considered as part of the production of both producers.

Orders placed pursuant to allocation on Form GA-193 must be endorsed in accordance with instructions on that form. Orders placed pursuant to allotments on Form CMPL-150 must be endorsed with the allotment symbol FC and the appropriate certification.

3. Shipments of steel in controlled material form by a producer to the customer of another producer, regardless of who invoices the material, may be made on the basis of authorized controlled material orders if rolling space within 110 per cent of the Production Directive or finished stock is available. The producer making the shipment must report it under the appropriate allotment symbol furnished by the customer, while the other producer must not report the shipment at all. The material will be considered a part of the shipping producers production.

•

## Rail Steel Reinforcing Bars Offered for Stock

• • • **WPB has renewed its offer of rail steel stock as a substitute for reinforcing steel during the fourth quarter.**

## Price Briefs

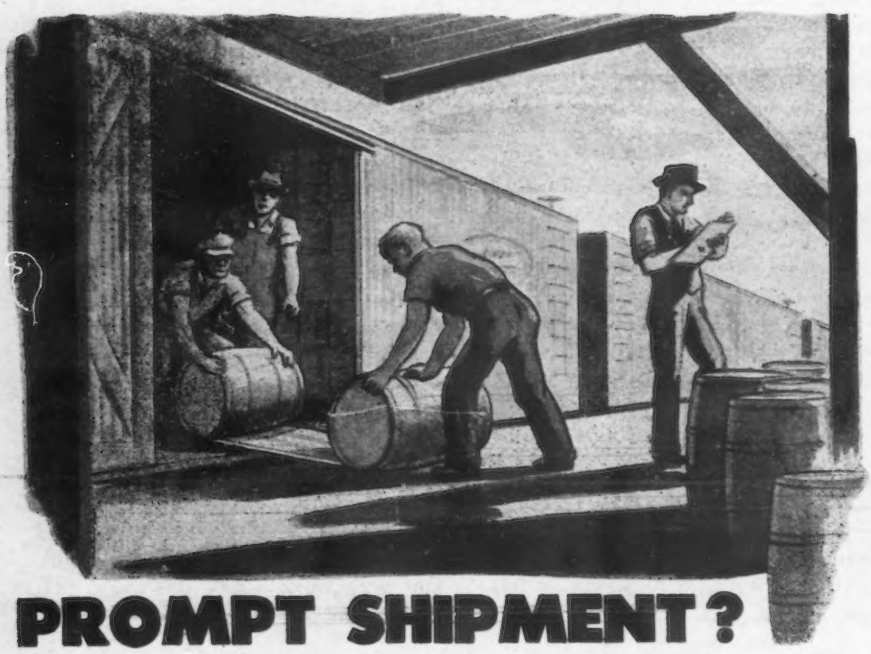
• Amend. 2 to MPR 317 gives specific dollars and cents ceilings, which continue at levels 5 to 20 per cent under comparable brass products, to iron, steel and plastic lines of tubular and cylindrical locks and lock sets when sold by manufacturers and jobbers. (Release No. OPA-3155)

•

• Amend. 99 to MPR 136 and Amend. 1 to MPR 1 permits the War and Navy Departments to use the pricing methods previously provided for the Defense Plant Corp. in the sale of second hand machines and parts and second hand machine tools acquired for purposes of rental. (Release No. OPA-T-1239)

•

• Amend. 7 to MPR 133 revises the regulation to make it consistent with present requirements that purchasers obtain authorization to buy rationed equipment. (Release No. OPA-3189)

PROMPT SHIPMENT?

OF COURSE!

But because abrasives are a critical material today, we can't always ship LIONITE Abrasive Grains within 24 hours as we used to do. So we suggest that you keep an accurate count on your stocks and order your LIONITE and CARBONITE grains as far ahead as possible.

By so doing you help us plan our production schedule and help our distributors keep their stocks in balance.

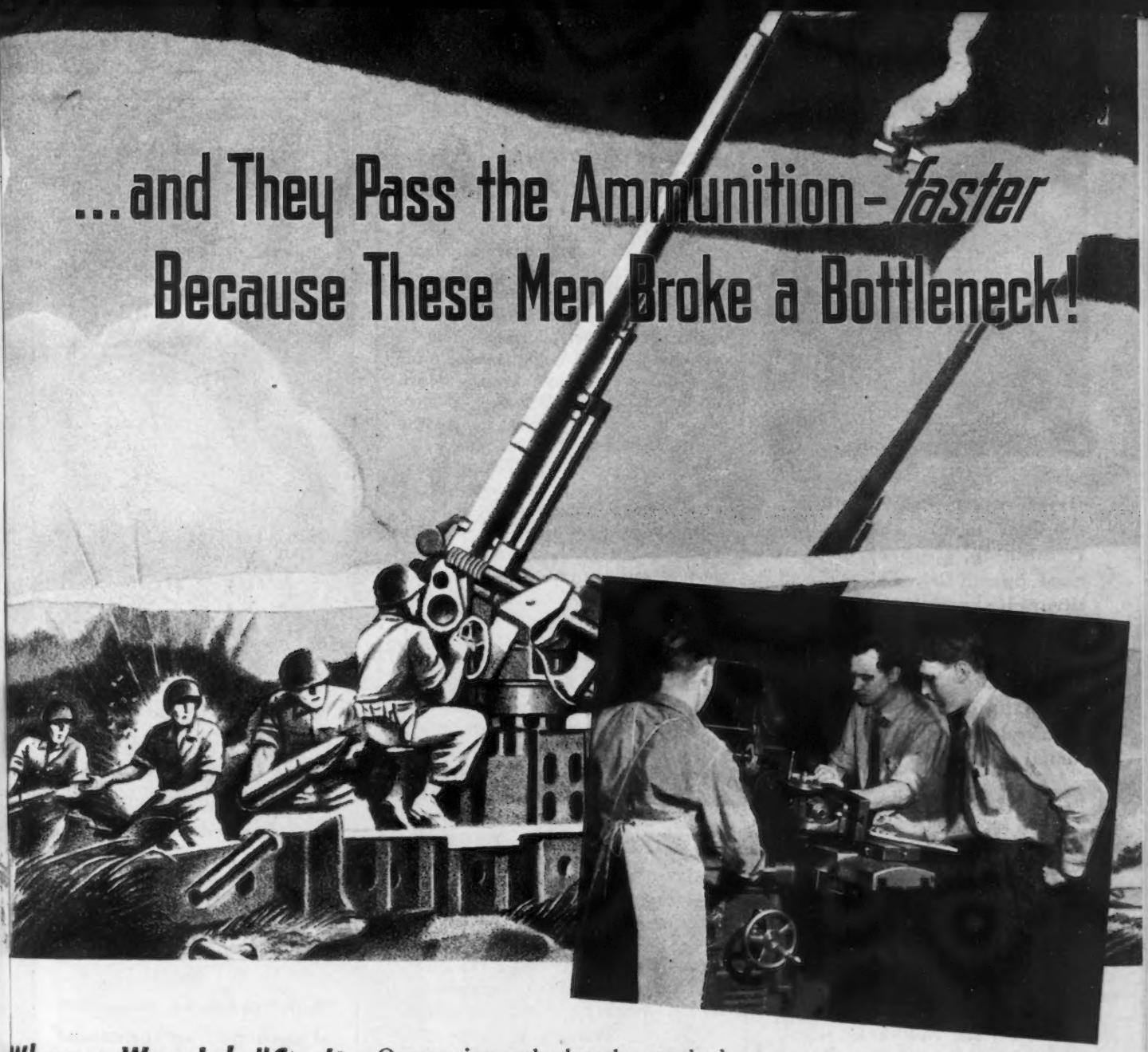
LIONITE and CARBONITE grains are playing an all important part in the war effort. These sharp, hard, fast-cutting grains are preferred in thousands of war plants because of their long life and uniformity from lot to lot.

For polishing, grinding, buffing or lapping you can't buy better grains than LIONITE and CARBONITE. They are made in grades and sizes to suit any requirement.

GENERAL ABRASIVE COMPANY, INC.

NIAGARA FALLS, N. Y., U. S. A.

# ...and They Pass the Ammunition—*faster* Because These Men Broke a Bottleneck!



## *When a War Job "Can't be Done"—the Cutting Tool Industry Does it!*

You never hear much about the work it's doing. But without America's highly specialized cutting tool industry, America would be *without* a big edge over an alleged "super" race.

For here's a significant fact: cutting tools give life to machine tools . . . machine tools that build Axis-blasting guns, shells, tanks, planes.

Yes, and total war brought totally new and serious problems to the cutting tool industry. Production demands skyrocketed to new peaks—and so did shortages of two critical elements: manpower and materials.

Such tremendously expanding operations naturally gave rise to engineering problems of grave complexity. Overcoming such obstacles required the mustering and all-out concentration of the initiative, experience and brainpower of the cutting tool industry's best minds.

A revealing example of that cooperation is pictured above. Here . . . Barber-Colman cutting tool experts are shown developing a special cutter. In a similar manner, UNGROUND thread milling cutters were developed *—within tolerances of only 5/10,000ths of an inch*—for threading high-powered shells.

That was the Army and Navy specification that *had* to be met. Performance like that was formerly attainable only through time-consuming and laborious grinding operations. A bottleneck, yes, but Barber-Colman engineers found a way to break it. Production of Axis-smashing ammunition was enormously stepped up.

From now until victory, of course, Barber-Colman facilities are aimed at only one objective: helping to win that victory. When the war is won, look to Barber-Colman engineering to make short work of peacetime production problems, too!

# Barber-Colman Company

GENERAL OFFICES AND PLANT • 204 LOOMIS STREET • ROCKFORD, ILLINOIS, U. S. A.

**Complete Cutting Tool Service • Engineering • Manufacturing**

**Hobs • Milling Cutters • Reamers • Special Tools • Sharpening Machines**

**If you're carelessly "painting" the floor of your plant with inflammable, slippery oil, you need Speedi-Dri. Take a walk through the shop. Notice the condition of the floor around the machines. Can you *possibly* overlook the danger of your employes slipping in that oily mess? *Think* what a carelessly dropped match or cigarette might do!**

Speedi-Dri soaks up grease and oil like a sponge, sets up an immediate skid-proof surface and blankets the hazard of flash fires. So great is its affinity for oils that, in time, it will pull old deposits right out of the floor, restoring the original appearance. Speedi-Dri saves workmen's shoes from oil-rot, minimizing the danger of foot infections. Easily and quickly spread by hand, it conserves vital manpower. No matter what you are now using, Speedi-Dri can do the job better, faster, cheaper. Prove it by testing Speedi-Dri in your own shop. (Where water is present or water soluble oils are used, ask for Sol-Speedi-Dri.) Prompt service from warehouse stocks in leading cities.

*Ask for demonstration* or write for a generous free sample of Speedi-Dri.*

SPEEDI-DRI
OIL AND GREASE ABSORBENT

**SUPPLIERS**
*East*—**REFINERS LUBRICATING CO.**
New York 1, N. Y.
*Midwest and South*
**WAVERLY PETROLEUM PRODUCTS CO.**
Philadelphia 6, Pa.
*West Coast*
**WAVERLY PETROLEUM PRODUCTS CO.**
Russ Building, San Francisco 4, Calif.




## *Unused Allotment Returns Are Clarified*

***Washington***

• • • **If a secondary consumer** of controlled materials is required by the terms of CMP Regulation No. 1 to return an allotment of controlled materials to the person from whom he received it, and it is impracticable for him to do so, he may make the return to the Claimant Agency whose symbol appears on the allotment, or to the War Production Board if the allotment bears one of the WPB symbols. This is specifically provided for in Direction No. 26 to CMP Regulation No. 1, announced last week by WPB.

For example, a manufacturer of metal stampings receives orders from many manufacturers, accompanied by allotments all bearing the allotment number, N-6. As a practical matter, he places all of the allotments in a single allotment account, designated N-6. If his requirements for the manufacture of metal stampings are reduced for any reason, it would be very difficult for him to determine what portion of the total allotment should be returned to each customer and, furthermore, the amount returned to each would probably be small. Under Direction No. 26 to CMP Regulation No. 1, he is permitted to return his excess allotments directly to the Navy. In making returns of allotments under the direction, Form CMP 32, "Consumers Return of Allotments," must be used.

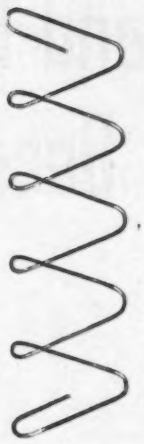
•

## WPB Places Chromium Under Allocation Control

***Washington***

• • • **WPB placed primary chromium** chemicals under allocation control through the issuance of Supplementary Order M-18-b, last Thursday.

The order previously provided that WPB could issue directives from time to time covering purchases, deliveries, production and use of primary chromium chemicals. Consumers were required to report on form PD-54 stating total consumption broken down by end use and preference ratings. Under the amended order, reporting on Form PD-54 is discontinued. Instead, consumers report on Form WPB 2954 (formerly PD-600) and suppliers on WPB 2945 (formerly PD-601). Exemption from authorization is provided for acceptance of delivery in any month of not more than 100 lb. of any prime chromium chemical.

## *They Pack A Knockout Punch*

**• A split second after a Ranger pulls the trigger this spring lifts a live cartridge into the firing chamber of the new Army carbine. Formed automatically, the wire we use is like the men in our amphibious command—resilient, tough, tireless.**

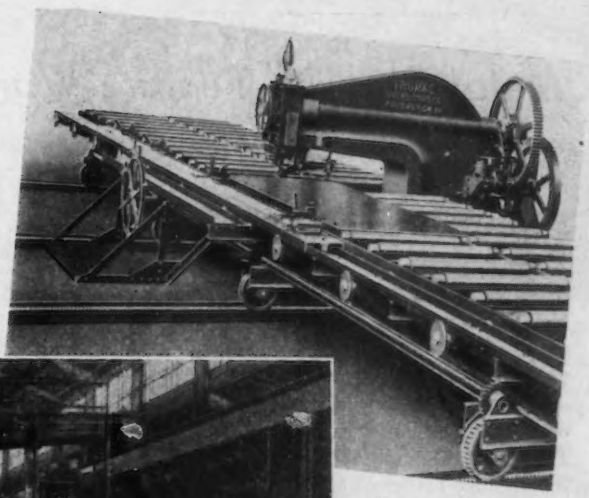
**Holly produces thousands of springs, wire forms and small stampings in every conceivable shape. Call us in. Our experience and facilities can help you lick *your* problem.**

***Write, wire or better still... phone us!***

AMERICAN SPRING OF HOLLY, INC.
HOLLY, MICHIGAN

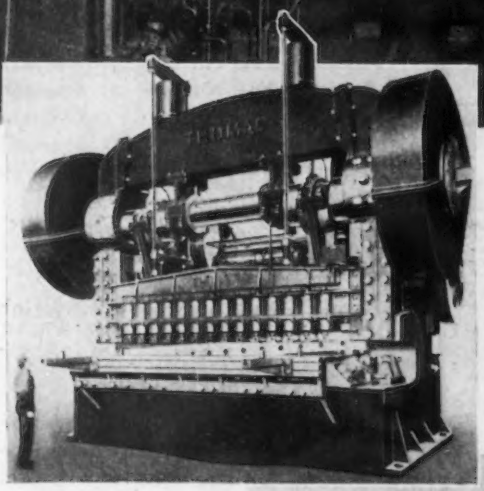
# THOMAS

## *can help meet your production needs!*

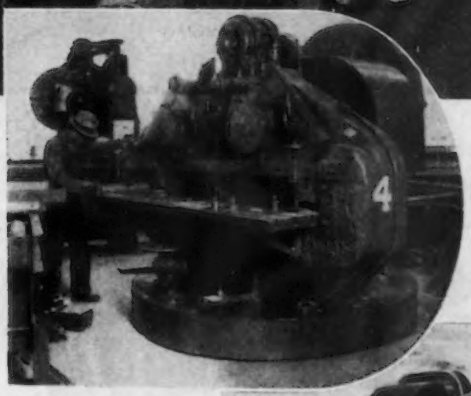


*Above*
Thomas High Precision Plate Punch and Table for punching ship, tank, boiler, car and various kinds of plates.

View of central aisle, in main plant.

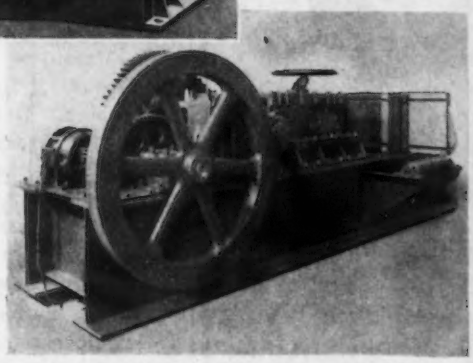


*At left*
Angle Shear.

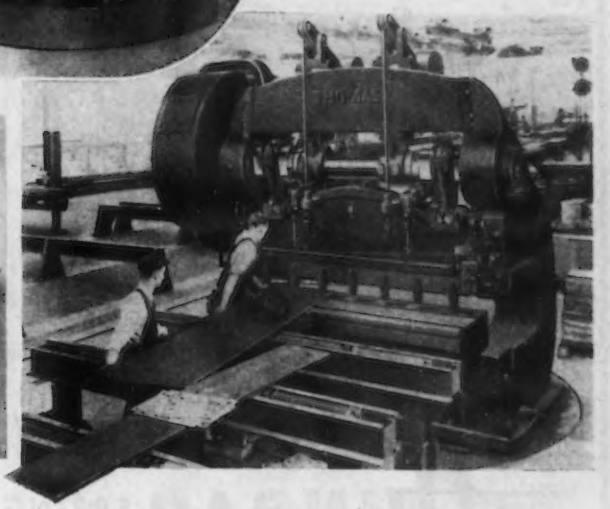


*Below*
Thomas Shears. Built with capacities up to 3 inches in thickness and widths up to 14 inches or more.

*Above*
Heavy Duty Plate Shear.



*At right*
Bending and Straightening Machines.



WHETHER it's punching and shearing equipment, or other types of production machinery and fabricating equipment, THOMAS specialization and skill is at your command.

If special machinery is required, Thomas can meet your problems with equal efficiency. Ask for further information; let us estimate on your requirements.

**THOMAS**
**MACHINE MANUFACTURING COMPANY**
PITTSBURGH, PA.

# Metal Show to Feature War Conferences

*Cleveland*

• • • **The 25th National** Metal Congress and War Conference at Chicago from Oct. 18 to 22 will feature a series of 17 sessions held each afternoon and evening, devoted to war production, conservation, and post war planning. These sessions will be in addition to the regular technical program scheduled for the morning meetings of the American Society for Metals. The regular technical meetings of the American Institute of Mining and Metallurgical Engineers, American Welding Society, and the Wire Association also will be presented. The displays at the Metal Show will consist of about 175 exhibits on the seventh, eighth, and ninth floors of the Palmer House, where manufacturers' light equipment will be demonstrated.

**The annual meeting** of the American Society for Metals, to be held in the Ball Room of the Palmer House on Wednesday, Oct. 20 at 9:00 a.m., will be for the election of new officers. M. A. Grossman, director of research of Carnegie-Illinois Steel Corp., Chicago, is scheduled for presidency, succeeding H. J. French of International Nickel Co. Dr. Kent R. Van Horn, research metallurgist, Aluminum Co. of America, Cleveland, has been nominated vice-president, succeeding Mr. Grossman. Harry D. McKinney, vice-president and works manager, Driver Harris Co., Harrison, N. J., received the nomination for treasurer.

C. H. Mathewson, professor of metallurgy, Yale University, will deliver the Edward de Mille Campbell Memorial Lecture, and Charles H. Herty, Jr., assistant to the vice-president, Bethlehem Steel Co., will receive the Albert Sauveur Achievement Award.

**Zay Jeffries**, technical director, Lamp Division of General Electric Co., Cleveland, will receive the A.S.M. Gold Medal, a new award this year given to one recognized for outstanding metallurgical knowledge who has shown great versatility in the application of science to the metal industry.

Another new A.S.M. award, the Medal for the Advancement of Research, will also be given this year. The recipient of this award has not yet been finally decided upon. This award will be made to an executive in an industrial organization, the principal activity of which is the production or fabrication of metals. The winner will be one who, over a period of years, has consistently sponsored metallurgical research or development and has helped to support financially the arts and sciences relating to metal.

## Ore Consumption Rises; Stocks Down

*Cleveland*

**• • • In spite of hot weather, iron ore consumption in the United States during August for the fourth month this year passed the seven million ton mark with a total of 7,399,545 gross tons being consumed. With Canada's consumption of 217,256 tons, the total consumption of Lake Superior ores during the month was 7,616,801 gross tons.**

**Meanwhile, ore stocks at the furnaces and at Lake Erie docks rose to 38,571,667 gross tons on Sept. 1, from a total of 32,388,-932 tons a month earlier.**

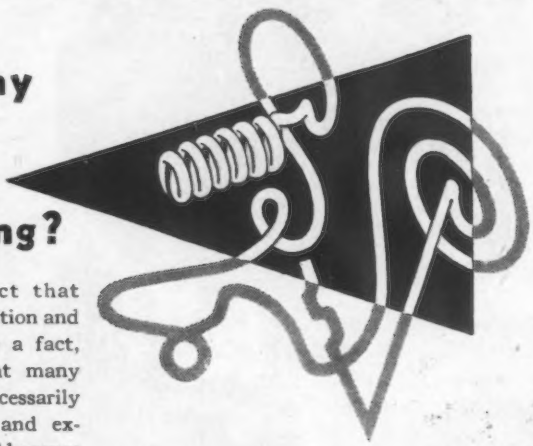
## New Ersatz for Auto Tubes Developed By Martin

*Baltimore*

• • • **A new material** that promises to outmode rubber in automobile innertubes and numerous other products has been developed by the Glenn L. Martin Co., builder of the Martin Marauder, Baltimore, and Mariner bombers. Developed in the Martin plastics research laboratory by Clayton F. Ruebensaal and Earl H. Sorg, the new elasto-plastic known as Marvinol has already demonstrated its superiority to both natural and synthetic rubber for such varied applications as automobile inner tubes, elastic gloves for home, hospital, and laboratory use, and many general household and industrial products.

Marvinol is a new material with properties all its own; a vinyl-type thermoplastic. Like other vinyl plastics, the basic ingredients of Marvinol are coal, air, salt and water. Complete reclaimability for reuse is one of the new product's greatest advantages.


**How many BENDS in a Spring?**



Here's a subject that deserves close attention and investigation. It's a fact, sad but true, that many springs are unnecessarily intricate, difficult and expensive to make, all because of lack of understanding of the ultimate purpose. Ofttimes, a simplified design — or a different type of material can do wonders in the way of reducing costs and "upping" performance. Here's where experience in spring design pays off. Let the springmaker in on your requirements — in the early stages if possible.

*A good spring in time saves nine!*

DUNBAR SPRINGMAKERS

SPRINGS WIRE FORMS SMALL STAMPINGS

DUNBAR BROS. CO., Bristol, Conn.

Division of Associated Spring Corporation

# He Never Has to Take His Eyes Off the Cutter and Work

# DEVLIEG JIGMIL

**Spindle start, stop and reverse—**

**Power vertical feed and rapid traverse movement—**

**Power horizontal feed and rapid traverse movement—**

**Power automatic table retraction and repositioning—**

**Power feed and rapid traverse to bar movement—**

**are all carried in a master switch on the spindle head—at the operator's finger tips.**

Thus, the operator of the DeVlieg Jigmil can fix his vision on the cutter and work—never has to look at controls during operation.

The Jigmil is what a machine tool should be—a powerful and accurate extension of the operator's hand. The value in precision boring and milling is apparent.

### *It's a* NEW *Type Machine*

Spacing Accuracy of a Jig Borer . . . Performance Qualities of a Milling Machine . . . Convenience and Flexibility of a Horizontal Boring Mill.

New speed of operation . . . New standards of excellence of bored holes . . . New accuracy in milling . . . Automatic table retraction and repositioning dependable within .0002".

Many machines show 75% greater average daily productivity.

*Write for Circular*
DEVLIEG MACHINE TOOLS

## DE VLIEG MACHINE COMPANY

450 FAIR AVENUE, FERNDALE (DETROIT), MICHIGAN

# PERSONALS

GEORGE M. GILLEN, assistant manager of combines sales, Lukens Steel Co. and subsidiaries, Coatesville, Pa.

• **Charles W. Pickens** was made traffic manager of the Oldsmobile Division of General Motors, succeeding Don C. Whitmore. Mr. Pickens has been with General Motors 15 years. **A. S. Corwin** was named assistant traffic manager. Mr. Corwin has been with General Motors 22 years.

• **Frederick H. Bucholz** has been elected president of the Omaha Steel Works. **Karl E. Vogel**, formerly second vice-president and general manager, was made executive vice-president. **Paul H. Leussler** was chosen a director and named second vice-president. **Drexel Sibbernsen** was chosen a member of the board of directors.

• **Clyde O. DeLong**, manager of operations, industrial products sales division of the B. F. Goodrich Co., Akron, since 1941, has been named manager of drug sundries sales. **George J. Fisher**, formerly assistant operating manager, has been appointed acting operating manager of the division succeeding Mr. DeLong. **William E. Powell** was named field sales manager and **Charles J. Astrup** appointed assistant to Mr. DeLong.

• **J. J. Topolinski** has been made works manager of Skilsaw, Inc., Chicago. Mr. Topolinski succeeds **L. E. Parker**, vice-president, who has resigned from the company. Mr. Topolinski has been associated with Skilsaw 11 years and until his recent promotion, had been superintendent under Mr. Parker.

• **Frank J. Staral** has been appointed field engineer of Alloy Casting Co., Champaign, Ill. Mr. Staral who was formerly with Republic Steel Co., will cover the Illinois and Iowa area. **James H. Ross** has been made field metallurgical engineer for the Detroit office of the company.

• **R. H. Wendt** and **K. W. Tibbits** have been elected respectively vice-president in charge of engineering and vice-president in charge of manufacturing. Mr. Wendt was formerly chief engineer and Mr. Tibbits was production manager.

A. N. MORTON, vice-president and director of Mack Mfg. Corp., New York.

• **A. N. Morton** has been made vice-president and director of Mack Mfg. Corp., New York. Mr. Morton joined the company as chief inspector shortly after World War I. Recently he was made manager of the Mack factories at Plainfield and New Brunswick, N. J., and Allentown, Pa. At the same time **C. W. Haseltine** was appointed vice-president of Mack Trucks, Inc. He started with the company in 1912 as a clerk. In 1918 he was made secretary-treasurer, a position he still holds.

• **Joseph D. Canty** has taken over the office of Buffalo area war manpower director. He replaced **Leroy Peterson**, who will take charge of the New York City area WMC office, which is separate from the regional office.

• **William J. Conley**, former chairman of the Engineering Department of the University of Rochester, has been appointed consulting engineer for the Lincoln Electric Co., Cleveland. In addition to his consulting work Mr. Conley will have charge of the company's courses in welding engineering and design.

• **C. D. Barnhart** has been recently elected chairman of the board of directors of the W. S. Rockwell Co., New York. Other members of the board elected were: **C. B. Kentnor, Jr.**, president; **J. A. Doyle**, vice-president; **H. J. N. Voltman**, secretary; and **G. A. Yagle**, treasurer.

• **E. F. Schiele**, who recently resigned as sales manager and director of the Massey-Harris Co., Racine, Wis., has joined the sales department of the J. I. Case Co., Racine, as contact man with branches and dealers.

• **Philip R. Brown** was elected vice-president of Reliance Steel Corp., Cleveland, and will assume charge of the midwest division of the company with headquarters in Chicago. Mr. Brown has been with Reliance since its incorporation in 1937 in an executive capacity, and previously was with the original affiliated companies that were the predecessors of the present organization.

• **George H. Broadus** has been made traveling freight agent at Kansas City for the Wabash Railroad Co. He succeeds **E. R. Marsh** who has been granted leave of absence.

C. W. HASELTINE, vice-president of Mack Trucks, Inc., New York.

• **J. C. Vignos** has been appointed general manager of sales for the Ohio-Ferro Alloys Corp., Canton, Ohio. He succeeds H. A. Landon, who became the Pacific coast representative of the company. Mr. Vignos became associated with the company in 1929, serving as chemist, sales representative, director of research, and asst. executive vice-president.

• **Heman Greenwood,** for the past six years vice-president of United States Steel Export Co., has been elected vice-president of Carrier Corp. He will be in charge of its International Division. Prior to his association with U. S. Steel Export Co., Mr. Greenwood was vice-president of International General Electric Co.

**HEMAN GREENWOOD, vice-president in charge of the International Division of the Carrier Corp., Syracuse, New York.**

• **Clayborn L. Jackson,** editor of *Acme News,* house organ of Acme Steel Co., Chicago, has been elected president of the American Association of Industrial Editors. Other association officers elected were: First vice-president, **Clint McKnight,** Diamond Alkali Co., Painesville, Ohio; second vice-president, **Ralph Lewis,** Caterpillar Tractor Co., Peoria, Ill.; third vice-president, **Maxey Morrison,** Curtiss Wright Corp., Caldwell, N. J.; secretary, **Jane Lavin,** International Resistance Co., Philadelphia; and treasurer, **H. E. Hornberger,** Gulf States Paper Co., Tuscaloosa, Ala.

• **G. V. Kullgren** has joined the staff of the Farrel-Birmingham Co., Inc., Ansonia, Conn. Mr. Kullgren's headquarters will be at the Akron, Ohio, plant of the company. He was formerly associated with the industrial engineering division of General Electric Co., specializing on the application of electrical equipment to the rubber industry.

**J. C. VIGNOS, general manager of sales, Ohio-Ferro Alloys Corp., Canton, Ohio.**

• **Lester B. Knight,** vice-president of National Engineering Co., Chicago, has resigned to enlist in the Navy. **R. L. McIlvaine,** manager of engineering sales for the company, will take over Mr. Knight's duties.

• **Lawrence B. Jackson** has been appointed director of engineering of the diesel division of American Locomotive Co., New York. He was formerly manager of engineering for Fairbanks Morse & Co.

• **Charles A. Petri** has been made advertising manager of the Falk Corp., Milwaukee. He replaces **Ralph H. Diehl** who recently joined the Army Air Force. Mr. Petri was formerly associated with the Harley-Davidson Motor Co.

• **R. W. Morrison,** manager of the industrial pneumatic tool division of the Aro Equipment Corp., Bryan, Ohio, has been appointed by the WPB as a member of the Portable Pneumatic Tool Industry Advisory Committee.

• **F. L. Magee** has been appointed general production manager and assistant to vice-president I. W. Wilson of the Aluminum Co. of America. He had been product manager for sheet since 1937. **Donovan Wilmot** becomes product manager for sheet and takes the position vacated by Mr. Magee, while **Ralph V. Davies,** manager of the New York office, will be transferred to Pittsburgh to become product manager for ingot, the position held for the past two years by Mr. Wilmot. **Edward B. Wilber,** who has been manager of the Washington office since 1935, will be transferred to the New York office. **Arthur P. Hall,** who has been serving in the Washington office for the past four years, will be the Washington office manager.

• **C. Edgar Maynard,** development engineer and director of the Fisk Division, and general operating manager of the Chicopee Division of United States Rubber Co., has resigned.

# OBITUARY...

• **H. W. Hardinge,** chairman of the board of directors of the Hardinge Co. Inc., New York, died recently. He was 87 years of age. Mr. Hardinge, who invented the conical ball, an apparatus for the fine grinding of ores, resigned as president of the company in 1936.

• **William J. Donnelly,** who retired several years ago as treasurer of the George H. Smith Casting Co., Milwaukee, died Sept. 11. He was 60 years of age.

• **Jacob Lund,** former treasurer of the Racine Wagon & Carriage Co., Racine, Wis., died recently. He was 73 years old.

• **Herman C. Schlack,** manager of the Airflex Equipment Co., Detroit, died Sept. 15. He was 60 years of age.

• **Alfred J. Chamberlin,** president of the Chamberlin Developments Co., Milwaukee, died Sept. 16 after a short illness. Before organizing the Chamberlin firm two years ago, he was production and sales supervisor for the Geuder, Paeschke & Frey Co., Milwaukee.

• **Henry L. Brueggemann,** director of purchases for Acme Steel Co., Chicago, died suddenly, Sept. 15, following a heart attack. He came to Acme Steel Co. as purchasing agent in January, 1934, and was appointed director of purchases a year ago.

# MACHINE TOOLS

. . . News and Market Activities

## Lay-Offs Not Related to Renegotiation

*Cleveland*

• • • **The announcement** that final results of renegotiation of Warner & Swasey Co. by Undersecretary of War Robert P. Patterson, to the effect that $5,500,000 turnback to the government had been consented to by the company brought no comment from the company because officials felt that the renegotiation case for the company is incomplete. The recent interpretation of the law that DPC contracts did not come under the classification of non-renegotiable business leaves this block of Warner & Swasey's 1942 business to come up for renegotiation.

Following close on the heels of the announcement concerning renegotiation, it was revealed by the company that for a matter of some weeks, layoffs at the Warner & Swasey plants would increase. Large scale changeover from the manufacture of turret lathes to other types of war business, almost entirely on a subcontract basis, is the reason for the lay-offs. Not being able to maintain production at 100 per cent of plant capacity during these changeovers and a very critical manpower shortage in the Cleveland area make this move necessary. Layoffs have been taking place for a few weeks but the tempo will be increased.

There is no connection, it was stated by an official of the company, between the action of the renegotiating board and the lay-offs. The matters are entirely unrelated, and the lay-offs were necessitated by the inability to keep the force operating at full capacity during a period of designing, retooling, and setting up to start production on the new work. How extensive the layoffs will be is extremely problematical, likewise depending upon the volume of new business and the speed with which it can be put into production.

o o o

## Tool Engineers Map Meeting Program

*Detroit*

• • • **Recognized authorities** on such subjects as heat treating, material handling, plant layout, gear production and tooling for inexperienced operators will speak at the semi-annual meeting of the American Society of Tool Engineers, to be held at the Claypool Hotel, Indianapolis, Oct. 11 and 12.

At the Monday morning session, G. B. Berlien, chief metallurgist, Lindberg Steel Treating Co., will discuss sub-zero refrigeration for austenitic decomposition of high alloyed steels. He will be followed by a talk on the Tocco process of induction heating, by Dr. H. B. Osborn, Jr., research and development engineer, Tocco Division, Ohio Crankshaft Co. The afternoon session will be devoted to material handling equipment. C. S. Huntington, chief engineer of the Link-Belt Co., Chicago, will describe fixed types, while Ezra W. Clark, vice-president, and general manager Clark Tructractor Division, Clark Equipment Co., will review mobile types. "Materials Handling Engineering" is the subject of a paper to be presented by Randolph W. Mallick, section engineer of Westinghouse Electric & Mfg. Co.

**At the session on gears**, to be held Tuesday morning, W. P. Schmitter, chief engineer of the Falk Corp., will discuss heavy duty gear design and manufacture, while Charles G. Pfeffer, Wright Aeronautical Corp., will cover design and production of aircraft gears. The making of machine parts from metal powder will be described by **A. J. Langhammer**, president of the Amplex Division of Chrysler Corp. In the afternoon, L. R. Twyman, Vickers Inc., is scheduled to talk on hydraulics in machine control and fixture operation, and John Cotner, president, Logansport Machine Co., will discuss the application of pneumatic and hydraulic devices to tools and machines.

The Tuesday evening session will be given over to the design and production of the Allison liquid-cooled aircraft engine, the two speakers being Dimitrius Gerdan, engine development engineer of the Allison Division of General Motors Corp., and Richard S. Kegg, supervisor of the gear laboratory.

At the banquet, Monday evening, the principal speaker will be G. Scott Fletcher, director of field development, Committee for Economic Development. The toastmaster will be James R. Weaver, manager of the Louisville Ordnance Division of Westinghouse. Ray H. Morris, president of the A.S.T.E. and vice-president of Hardinge Brothers, Inc., will preside.

### Tool Shipments Fall

• • • **Shipments of machine tools in August totaled $87,827,000, representing a decline of 10 per cent from the July total of $97,541,000, according to the tools division of the WPB. Net new orders for August showed a gain of 16.2 per cent over July, adding up to $33,378,000, as compared with $28,713,000, due largely to a reduction in cancellations in August. The backlog of orders declined from $441,220,000 in July to $386,792,000 at the end of August, a drop of 12.3 per cent.**

•

## Used Machine Tool Prices Set for Army, Navy

*Washington*

• • • **The War and Navy** Departments may use the pricing methods previously provided for the Defense Plant Corp. in the sale of second-hand machines and parts and second-hand machine tools acquired for purposes of rental, OPA has announced.

Under the provisions made applicable to the War Department and the Navy sales of leased equipment to the first lessees, the maximum price may include all direct items of expense, plus interest, less depreciation at the rate of 8 per cent per year on sales made 90 days or more after the date of initial use. On other sales, the War Department and the Navy, as is now true in sales by the Defense Plant Corp., may recover their original cost f.o.b. factory, and freight from the place where the machine is located at time of purchase to the purchaser's plant less depreciation at 8 per cent per year.

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# NON-FERROUS METALS

. . . News and Market Activities

## Bendix Increase Mg Casting Output

• • • New Jersey foundries of Bendix Aviation Corp. produced during August a volume of magnesium castings equal to their entire output of all metal castings for all of 1939.

"In the four New Jersey foundries alone," Anthony Cristello, foundry manager of the Eclipse-Pioneer division stated, "monthly production of magnesium castings now averages nearly 400,000 lb. Increased facilities, which will be available shortly, will boost this total to exceed 8,500,000 lb. annually."

A single day's production of magnesium castings in Bendix foundries now exceeds the total yearly output for 1931, when the corporation first began foundry operations in a small foundry of 18,000 sq. ft., staffed by four employees, at Little Falls, N. J., Cristello explained.

Today the corporation, which launched magnesium foundry operations to provide castings for its own precision aircraft products, is one of America's largest suppliers of magnesium castings.

Bendix presently operates foundries in Teterboro, Little Falls, Hawthorne and North Bergen, N. J., employing several thousand men and women, all specially trained, Cristello said.

Complete mechanization of most foundry operations has contributed considerably to present high volume production, he stated.

"Increasing use of magnesium in aircraft to lighten weight, affording increased pay loads and tensile strength, has made this tremendous expansion necessary, not only to meet the company's own requirements, but to fill many other manufacturers' constantly increasing war production needs," Cristello said.

In 1931 magnesium castings represented only 17 per cent of the corporation's foundry output. Today half the castings turned out by the four New Jersey foundries are of magnesium.

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### *Scrap Dealers' Activity Down*

• • • Activity in dealers' non-ferrous scrap metal trading during July decreased for the second consecutive month according to the Bureau of Mines, Department of the Interior. Shipments of scrap to consumers fell off 6 per cent from the June figure to 74,624 tons, the lowest level in 16 months. July shipments were 10 per cent less than those in May. The decrease in dealers' receipts was not as pronounced, dropping from 79,655 tons in June to 77,187 tons in July, a decline of 3 per cent. Stocks rose slightly to 98,489 tons after four months in which scrap on hand remained virtually constant. A 3238 tons gain in aluminum scrap stocks more than counterbalanced minor gains and losses in other tlpes of scrap to raise the dealers' total non-ferrous stocks 2563 tons above the June closing inventory. Total stocks at the end of July were 8 per cent greater than those of the corresponding date in 1942. Figures reported for dealers' stocks and transactions are adjusted each month to cover virtually all non-ferrous scrap metal dealers in the United States, exclusive of peddlers and auto wreckers.

**Dealers' receipts of non-ferrous scrap from farms, households, factories, utilities, and other industrial sources of supply in 1943, gross weight, in short tons**

| Month | Type of non-ferrous Scrap Metal | | | | | | |
|---|---|---|---|---|---|---|---|
| (1943) | Copper | Lead-Tin | Aluminum | Zinc | Nickel | Magnesium | Total |
| January | 37,489 | 24,481 | 10,770 | 3,358 | 339 | 187 | 76,624 |
| February | 40,483 | 21,927 | 10,395 | 3,791 | 353 | 202 | 77,151 |
| March | 44,712 | 22,882 | 12,061 | 3,692 | 467 | 228 | 84,042 |
| April | 44,172 | 21,605 | 12,338 | 3,913 | 421 | 262 | 82,711 |
| May | 46,083 | 21,022 | 12,240 | 3,988 | 361 | 311 | 84,005 |
| June | 42,512 | 21,539 | 11,275 | 3,653 | 479 | 197 | 79,655 |
| July | 39,171 | 21,919 | 12,037 | 3,650 | 248 | 162 | 77,187 |

**Dealers' shipments of non-ferrous scrap to consumers in 1943, gross weight, in short tons**

| Month | Type of non-ferrous Scrap Metal | | | | | | |
|---|---|---|---|---|---|---|---|
| (1943) | Copper | Lead-Tin[1] | Aluminum | Zinc[1] | Nickel[1] | Magnesium | Total |
| January | 42,073 | 25,832 | 10,353 | 3,464 | 419 | 167 | 82,308 |
| February | 41,425 | 25,024 | 11,112 | 4,141 | 396 | 197 | 82,295 |
| March | 46,056 | 24,239 | 11,597 | 3,817 | 459 | 223 | 86,391 |
| April | 43,556 | 22,187 | 11,882 | 4,310 | 370 | 238 | 82,543 |
| May | 45,680 | 21,347 | 11,417 | 4,185 | 421 | 287 | 83,337 |
| June | 43,524 | 22,576 | 9,158 | 3,657 | 413 | 226 | 79,554 |
| July | 39,464 | 22,648 | 8,799 | 3,263 | 318 | 132 | 74,624 |

[1] Includes scrap melted by dealers.

**Dealers' stocks of non-ferrous scrap metals in 1943, gross weight, in short tons**

| Inventory Date | Type of non-ferrous Scrap Metal | | | | | | |
|---|---|---|---|---|---|---|---|
| (1943) | Copper | Lead-Tin | Aluminum | Zinc | Nickel | Magnesium | Total |
| Jan. 1 | 54,815 | 37,333 | 8,720 | 6,312 | 311 | 75 | 108,166 |
| Jan. 31 | 50,231 | 35,982 | 9,137 | 6,206 | 831 | 95 | 102,482 |
| Feb. 28 | 49,289 | 32,885 | 8,429 | 5,856 | 788 | 100 | 97,338 |
| March 31 | 47,945 | 31,528 | 8,884 | 5,731 | 796 | 105 | 94,989 |
| April 30 | 48,561 | 30,946 | 9,340 | 5,334 | 847 | 129 | 95,157 |
| May 31 | 48,964 | 30,621 | 10,163 | 5,137 | 787 | 153 | 95,825 |
| June 30 | 47,952 | 29,584 | 12,280 | 5,133 | 853 | 124 | 95,926 |
| July 31 | 47,659 | 28,855 | 15,518 | 5,520 | 783 | 154 | 98,489 |

•

### *No Foreign Silver for Brazing Alloys*

• • • WPB has prohibited any further use of foreign silver in the manufacture of brazing alloys or solders. However, manufacturers may complete processing of any foreign silver already in process, or use up one month's supply of the total foreign silver which was on hand on July 29. Stocks on hand may be delivered to any users for end products not appearing on List B.

This was effected by the issuance of Amendment 1 to Conservation Order M-199, as amended.

•

### *Price Increase Denied*

• • • A petition seeking an increase in the maximum price for osmium has been denied. The petition was filed by an important platinum metals dealer who sought an increase in the maximum price for osmium to $70 per troy oz. The present maximum prices established by Maximum Price Regulation No. 309, covering the platinum metals and their products, is $50 per oz. for osmium. The company claimed that the increased price was necessary to allow it to import osmium.

•

### *Magnesium Scrap Prices Clarified*

• • • Maximum prices for magnesium scrap are established by Maximum Price Regulation 302 with a quantity differential for lots of 1500 lb. or more. However, this quantity premium is applicable only if the 1500-lb.-lot consists of one grade.

## Refiner, Smelter Quotations

*(Cents per lb.)*

| | |
|---|---|
| Copper, electrolytic, Conn. Valley | 12.00 |
| Copper, electrolytic, New York | 11.75 |
| Copper, Lake | 12.00 |
| Tin, Straits, New York | 52.00 |
| Zinc, East St. Louis | 8.25 |
| Zinc, New York | 8.67 |
| Lead, St. Louis | 6.35 |
| Lead, New York | 6.50 |
| Aluminum, virgin 99+%, delivered | 15.00 |
| Nickel, electrolytic, base refinery | 35.00 |
| Magnesium, 99.9+%, carlots | 21.50 |
| Magnesium, 12-in. sticks, carlots | 30.00 |
| Cadmium, delivered | 90.00 |

ALUMINUM, No. 12 foundry grade (No. 2), 13.50c. per lb.; steel deoxidizing grades, 12.50c. to 13.75c. per lb. ANTIMONY, Asiatic, New York, nominal; American, 14.50c. a lb., f.o.b. Laredo, Tex., smelter. MERCURY, $191 to $193 per 76-lb. flask, f.o.b. shipping point or port of entry. BRASS INGOTS, commercial 85-5-5-5 (No. 115), 12.25c. a lb. COBALT, 97 to 99 per cent, $2.11 per lb. BERYLLIUM COPPER, 3.75 to 4.25 per cent Be., $15 per lb. contained Be. GOLD, U. S. Treasury, $35 an oz. INDIUM, 99.5 per cent, $10 per troy oz. IRIDIUM, $165 per troy oz. PALLADIUM, $24 per troy oz. PLATINUM, $35 per oz. SILVER, open market, New York, 44.75c. per oz. ARSENIC, prime, white, 99 per cent, 4c. per lb.

## Copper, Copper Base Alloys

*(Mill base prices)*

*Sheet:* Copper, 20.87c.; high brass, 19.48c.; low brass, 80 per cent, 20.15c.; red brass, 85 per cent, 20.36c.; commercial bronze, 90 per cent, 21.07c., 95 per cent, 21.28c.; manganese bronze, 28.00c.; Muntz metal, 22.75c.; naval brass, 24.50c.; phosphor bronze, grades A, B, 5 per cent. 36.25c.; Everdur, Herculoy, Olympic or equivalent, 26.00c.; nickel silver, 5 per cent, 26.50c.

*Rods:* Copper, hot rolled, 17.37c.; drawn, 18.37c.; free cutting brass, 15.01c.; low brass, 80 per cent, 20.40c.; red brass, 85 per cent, 20.61c.; commercial bronze, 90 per cent, 21.32c., 95 per cent, 21.53c.; Muntz metal, 18.87c.; naval brass, 19.12c.; phosphor bronze, grades A, B, 5 per cent, 36.50c.; Everdur, Herculoy, Olympic or equivalent, 25.50c.; nickel silver, 5 per cent, 28.75c.

*Extruded Shapes:* Copper, 20.87c.; architectural bronze, 19.12c.; manganese bronze, 24.00c.; Muntz metal, 20.12c.; naval brass, 20.37c.

## ALUMINUM

*Tubing:* 2 in. O.D. x 0.065 in. wall 2S, 40c. per lb. (½H); 52S, 61c. (O); 24S, 67½c. (T).

*Plate:* 0.250 in. and heavier; 2S and 3S, 21.2c. per lb.; 52S, 24.2c.; 61S, 22.8c.; 24S, 24.2c.

*Flat Sheet:* 0.188 in. thickness; 2S and 3S, 22.7c. a lb.; 52S, 26.2c.; 61S, 24.7c.; 24S, 26.7c.

2000-lb. base price for tubing; 30,000-lb. base price for plate, flat stock. Variations from the above gage, size, temper, finish and quantity require extras.

*Extruded Shapes:* "As extruded" temper; 2000-lb. base price. 2S and 3S, factor No. 1 to 4, 25.5c. per lb.; 14S, factor No. 1 to 4, 35c.; 17S, factor No. 1 to 4, 31c.; 24S, factor No. 1 to 4, 34c.; 53S, factor No. 1 to 4, 28c.; 61S, factor No. 1 to 4, 28½c.

The factor is determined by dividing perimeter of shape by the weight per lineal foot. All prices above are subject to factor number range, temper, length, dimensional tolerances and quantity extras.

*Wire, Rod and Bar:* Base price; 17ST and 11ST-3, screw machine stock. Rounds: ¼ in., 28½c. per lb.; ½ in., 26c.; 1 in., 24½c.; 2 in., 23c. Hexagonals: ¼ in., 34½c. per lb.; ½ in., 28½c.; 1 in., 25½c.; 2 in., 25½c. 2S, as fabricated, random or standard lengths, ¼ in., 34c. per lb.; ½ in., 25c.; 1 in., 24c.; 2 in., 23c. 24ST, rectangles and squares, random or standard lengths, 0.093-0.187 in. thick by 1.001-2.000 in. wide, 33c. per lb.; 0.751-1.500 in. thick by 2.001-4.000 in. wide, 29c.; 1.501-2.000 in. thick by 4.001-6.000 in. wide, 27½c.

Variation from the above size, temper, finish and quantity require extras.

## MAGNESIUM

Sheet, rod, tubes, bars and extruded shapes are subject to individual quotation. Magnesium Metal Turnings: 100 lb. or more, 46c. a lb.; 25 to 90 lb., 56c.; less than 25 lb., 66c. a lb.

# NON-FERROUS SCRAP METAL QUOTATIONS

## Copper, Copper Base Alloy

*(Current OPA maximum prices, cents per lb., f.o.b. point of shipment, plus premiums for quantities and special preparation.)*

| | |
|---|---|
| ***OPA Group 1*** | |
| No. 1 wire, No. 1 heavy copper | 9.75 |
| No. 1 tinned copper wire, No. 1 tinned heavy copper | 9.75 |
| No. 2 wire, mixed heavy copper | 8.75 |
| Copper tuyeres | 8.75 |
| Light copper | 7.75 |
| Copper borings | 9.75 |
| Lead covered copper wire, cable | 6.00* |
| Lead covered telephone, power cable | 6.04 |
| Insulated copper | 5.10* |
| ***OPA Group 2*** | |
| Bell metal | 15.50 |
| High grade bronze gears | 13.25 |
| High grade bronze solids | 11.50* |
| Low lead bronze borings | 11.50* |
| Babbitt lined brass bushings | 13.00 |
| High lead bronze solids | 10.00* |
| High lead bronze borings | 10.00* |
| Red trolley wheels | 10.75 |
| Tinny (phosphor bronze) borings | 10.50 |
| Tinny (phosphor bronze) solids | 10.50 |
| Copper-nickel solids and borings | 9.25 |
| Bronze paper mill wire cloth | 9.50 |
| Aluminum bronze solids | 9.00 |
| Soft red brass (No. 1 composition) | 9.00 |
| Soft red brass borings (No. 1) | 9.00 |
| Gilding metal turnings | 8.50 |
| Unlined standard red car boxes | 8.25 |
| Lined standard red car boxes | 7.75 |
| Cocks and faucets | 7.75 |
| Mixed brass screens | 7.75 |
| Red brass breakage | 7.50 |
| Old nickel silver solids, borings | 6.25 |
| Copper lead solids, borings | 6.25 |
| Yellow brass castings | 6.25 |
| ***OPA Group 3*** | |
| Yellow brass soft sheet clippings | 8.625 |
| Yellow rod brass turnings | 8.375 |
| Zincy bronze borings | 8.00 |
| Zincy bronze solids | 8.00 |
| Fired rifle shells | 8.25 |
| Brass pipe | 8.00 |
| Old rolled brass | 7.75 |
| Admiralty condenser tubes | 8.00 |
| Muntz metal condenser tubes | 7.50 |
| Plated brass sheet, pipe reflectors | 7.50 |
| Manganese bronze solids | 7.25[1] |
| | 6.25[2] |
| Manganese bronze borings | 6.50[1] |
| | 5.50[2] |
| ***OPA Group 4*** | |
| Automobile radiators | 7.00 |
| ***OPA Group 5*** | |
| Refinery brass | 5.00* |

*Price varies with analysis. [1] Lead content 0.00 to 0.40 per cent. [2] Lead content 0.41 to 1.00 per cent.

## Aluminum

*(Current OPA maximum prices, cents per lb., for less than 1000 lb. lots, f.o.b. point of shipment, plus premiums for quantities and special preparation.)*

| | |
|---|---|
| ***Plant scrap, segregated*** | |
| 2S solids | 9.00 |
| All other solids | 8.50 |
| Borings and turnings | |
| Wrought alloys (17S, 18S, 32S, 52S) | 7.50 |
| High grade alloys | 7.00 |
| Low grade alloys | 6.50 |
| ***Plant scrap, mixed*** | |
| All solids | 7.50 |
| Borings and turnings | 5.50 |
| ***Obsolete scrap*** | |
| Pure cable | 9.00 |
| Old sheet and utensils | 7.50 |
| Old castings and forgings | 8.00 |
| Pistons, free of struts | 8.00 |
| Pistons, with struts | 6.00 |
| Old alloy sheet | 7.00 |

For lots of 1000 to 19,999 lb., add 1c. to above prices except for old castings and forgings, pistons free of struts, pistons with struts and old alloy sheet for which there is a premium of ½c. a lb. For lots over 19,999 lb. add 1½c. a lb. to prices listed.

## Magnesium

| | |
|---|---|
| ***Segregated plant scrap*** | |
| Pure solids and all other solids, exempt Borings and turnings | 8.00 |
| ***Mixed, contaminated plant scrap*** | |
| Grade 1 solids | 11.00 |
| Grade 1 borings and turnings | 7.00 |
| Grade 2 solids | 9.00 |
| Grade 2 borings and turnings | 5.00 |

For lots over 1499 lb. add 1c. per lb.

## Zinc

*(Current OPA maximum prices, cents per lb., f.o.b., shipping point.)*

| | |
|---|---|
| New zinc clippings, trimmings | 7.25 |
| Engravers', lithographers' plates | 7.25 |
| Old zinc scrap | 5.75 |
| Unsweated zinc dross | 5.80 |
| Die cast slab | 5.80 |
| New die cast scrap | 4.95 |
| Radiator grilles, old and new | 4.95 |
| Old die cast scrap | 4.50 |

## Lead

Soft and hard lead, including cable lead, f.o.b. point of shipment, deduct 0.55c. per lb. from basing point prices for refined metal.

## Nickel

Nickel content 98 + per cent, copper under ½ per cent. 26c. per lb.; 90 to 98 per cent nickel, 26c. per lb. contained Ni.

# ELECTROPLATING ANODES AND CHEMICALS

### *Anodes*

*(Cents per lb., f.o.b. shipping point)*

| | |
|---|---|
| Copper: Cast, elliptical, 15 in. and longer | 25⅛ |
| Electrolytic, full size | 22⅞ |
| cut to size | 30⅛ |
| Rolled, oval, straight, 15 in. and longer | 23¼ |
| Curved | 24¼ |
| Brass: Cast, 82-20, elliptical, 15 in. and longer | 23¾ |
| Zinc: Cast, 99.99, 16 in. and over | 16¼ |
| Nickel: 99% plus, cast | 47 |
| Rolled, depolarized | 48 |
| Silver: Rolled, 999 fine per Troy (1-9) oz., per oz. | 58 |

### *Chemicals*

*(Cents per lb., delivery from New York)*

| | |
|---|---|
| Copper cyanide, tech., 100-lb. bbls. 1-5 | 5.65 |
| Copper sulphate, 99.5 crystals, bbls. | 13.00–13.50 |
| Nickel salts, single, 425-lb. bbls. | 34.00 |
| Silver cyanide, 100 oz. lots | 40.82–41.125 |
| Sodium cyanide, 96% dom., 100-lb. dms. | 0.15 |
| Zinc cyanide, 100-lb. dms. | 33.00 |
| Zinc sulphate, 89% crystals, bbls. | 6.80 |

# SCRAP

. . . News and Market Activities

## Outlook for Scrap Drive Termed Poor

• • • **As the Oct. 1 deadline** for the start of the new national salvage campaign becomes a present reality, hopes for the success of the drive as reported from various sections of the country are at low ebb. A general state of apathy seems prevalent and little enthusiasm or go-getting has been shown in any quarter.

The press is also charged by many with letting the drive get started with a minimum of press coverage. Paper restrictions on newspapers are tight and tightening and free publicity from Washington such as on this scrap drive is not likely to be used when real news is crowding for space.

In the midst of this, consumers are believed to be trying to stock-up on scrap although yards are not well prepared to deliver much above day-to-day needs. Labor shortages are restricting both preparation and collection of scrap in most areas—an inescapable factor affecting the success of any scrap drive.

Industrial scrap, including dormant scrap, can and must furnish the bulk of this winter's collections, according to all reports. Auto graveyards are slowing abruptly, home collections are expected to be poor in both quantity and quality (the civilian has been getting little in iron and steel since the last drive which might become scrap), gasoline and labor shortages are expected to hamper farm collections and demolition at best will produce but little.

•

### Navy Asks Use of Official Color-Code Scrap Segregation

*Washington*

• • • **Vital metals and alloys** salvaged from industrial scrap are returning much faster to fight on the battlefronts, since workers in Naval establishments and contractors' plants have been following the new Navy "color plan" to segregate these critical materials at the source, according to Rear Admiral Clark H. Woodward, U.S.N., Chief of the Navy Industrial Incentive Division.

The "color plan," developed by the Salvage Conservation Section of the Navy's Bureau of Supplies and Accounts, is a practical system of identifying metals at all stages of fabrication, from the original stock, through the machining process, and down to the scrap bins.

**While the details of** operation of the Navy's color segregation plan may of necessity vary in some plants, the general procedure is applicable to all. The color chart furnished to all Navy activities producing ferrous and non-ferrous scrap assigns a certain color circle to each grade or alloy of metal. A tag bearing this color symbol is placed on the machine to indicate the metal alloy being processed.

When the machine needs cleaning or when a *change* is made in the type of metal being machined, a flag is placed on the machine for the immediate attention of the sweeper. The sweeper fills the tote box and then transfers the identification tag from the machine to the box. The tote box is taken to a row of containers (placed against the wall or some other location that will not interfere with shop operations) and dumped in the container marked by the same color circle found on the tag.

•

### Scrap Quota Set

*Youngstown*

• • • **During the remainder** of the year, 86,824,000 lb. of industrial scrap will have to be obtained from Mahoning County manufacturers to insure continuance of Youngstown steel plants, according to the WPB industrial salvage branch. During the first six months of this year, 82,798,280 lb. of industrial scrap was produced.

Salvage workers were urged to try to get industries to dismantle old equipment no longer in use, especially if such equipment is in storage. Maintenance of peak steel production hinges on the adequacy of steel scrap supplies.

•

*CLEVELAND*—The scrap situation has been tightening up considerably insofar as mill supplies are concerned. Cast scrap is by far the most critical grade. Two foundries in the area, large users of cast scrap, have been ordered by WPB to stay out of the cast scrap market until other foundries have been able to work up some kind of an inventory.

Alloy solids are not moving too well, but because of the 8 per cent alloy turning electric furnace charge ruling the alloy turnings are moving fast. Stainless steep scrap and some of the tungsten bearing grades are hunting users.

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*ST. LOUIS*—The shortage of scrap in the St. Louis industrial district has been relieved a bit by increased movement from industries, but still remains serious. Dealers report that with the prospect of a drive beginning Oct. 1 some shipments have fallen off.

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*PITTSBURGH*—Blast furnace scrap is exceptionally tight here. The same condition applies to open hearth heavy melting scrap. All consumers are buying when material can be had. Dealers yards are bare of material in most cases and the coming scrap drive must make up for these deficiencies if a much tighter position is not to materialize. Nickel turnings are also scarce here.

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*BUFFALO* — Scrap business was slow again this week, with dealers still expressing doubts on the worthwhileness of the projected WPB salvage drive. Barge canal shipments of dealer scrap from New York also were delayed, chiefly due to preference being given oil boats in the locks. Despite the dull picture, consumers remained free of concern over their stockpiles.

•

*CINCINNATI* — Dealers are having a problem in disposing of alloy scrap, which they call three-way steel, since the only sizeable consumer who could use it would be mill operators, but the price is too high for their use. On the other hand, there seems to be some small resistance on the part of consumers to buy too far ahead, dealers indicating that some consumers who have 60-day inventories are curtailing purchases because of a feeling that war demand is downward. Foundries, on the other hand, because of the lack of ample supply of No. 1 cast grade scrap, are getting pinched, and in some cases emergency truck load shipments have been necessary in order to keep production going.

•

*BOSTON*—The 2000 tons of battlefield scrap offered by the government last week were sold to a greater Boston yard at around $11.30 a ton, f.o.b. Federal scrap agencies have bought small additional lots of abandoned rails at $40 to $50 a ton, removed, and the movement of shipyard scrap is fairly good. Unconfirmed report is that shipments on a barge rate basis are to be eliminated. Such shipments are a bone of contention with steel mills.

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*BIRMINGHAM*—With Alabama having been given the tough assignment under present conditions of collecting 234,000 tons of material during the national scrap drive, members of the trade here assert that solving the manpower problem of processing the scrap and getting it to mills may be more difficult than getting the tonnage quota to dealers' yards.

## IRON AND STEEL (OTHER THAN RAILROAD) SCRAP

(All Prices Are Per Gross Ton)

| | BASIC OPEN HEARTH GRADES | | BLAST FURNACE GRADES | | | | ELECTRIC FURNACE, ACID OPEN HEARTH AND FOUNDRY GRADES | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Low Phos. | | Heavy Structural and Plate | | | Foundry Steel | | | | |
| | No. 1 & 2 Hvy. Melt. No. 1 Cp. Blk. Shts. No. 1 & 2 Bundles No. 1 Busheling | Unbaled* Machine Shop Turnings | Mixed Borings and Turnings | Cast Iron Borings | Shoveling Turnings | No. 2 Busheling | Billet, Bloom, Forge Crops | Bar Crops, Punchings Plate Scrap and Cast Steel | 3 ft. and Under | 2 ft. and Under | 1 ft. and Under | 2 ft. and Under | 1 ft. and Under | Auto. Springs, and Crankshafts | Alloy Free Low Phos. and Sulphur Turnings | Heavy Axle and Forge Turn. First Cut | Electric Furnace Bundles |
| Pittsburgh, Brackenridge, Butler, Monessen, Midland, Johnstown, Sharon, Canton, Steubenville, Warren, Youngstown, Weirton | $20.00 | $15.00 | $15.00 | 16.00 | $17.00 | $17.50 | $25.00 | $22.50 | $21.50 | $22.00 | $22.50 | $21.50 | $22.00 | $21.00 | $18.00 | $19.50 | $21.00 |
| Cleveland, Middletown, Cincinnati, Portsmouth | 19.50 | 14.50 | 14.50 | 15.00 | 16.50 | 17.00 | 24.50 | 22.00 | 21.00 | 21.50 | 22.00 | 21.00 | 21.50 | 20.50 | 17.50 | 19.00 | 20.50 |
| Chicago, Claymont, Coatesville, Conshohocken, Harrisburg, Phoenixville, Sparrows Point | 18.75 | 13.75 | 13.75 | 14.75 | 15.75 | 16.25 | 23.75 | 21.25 | 20.25 | 20.75 | 21.25 | 20.25 | 20.75 | 19.75 | 16.75 | 18.25 | 19.75 |
| Ashland, Ky. | 19.50 | 14.50 | 14.50 | 15.50 | 16.50 | 17.00 | 24.50 | 22.00 | 21.00 | 21.50 | 22.00 | 21.00 | 21.50 | 20.50 | 17.50 | 19.00 | 20.50 |
| Buffalo, N. Y. | 19.25 | 14.25 | 14.25 | 15.25 | 16.25 | 16.75 | 24.25 | 21.75 | 20.75 | 21.25 | 21.75 | 20.75 | 21.25 | 20.25 | 17.25 | 18.75 | 20.25 |
| Bethlehem, Pa.; Kokomo, Ind. | 18.25 | 13.25 | 13.25 | 14.25 | 15.25 | 15.75 | 23.25 | 20.75 | 19.75 | 20.25 | 20.75 | 19.75 | 20.25 | 19.25 | 16.25 | 17.75 | 19.25 |
| Duluth, Minn. | 18.00 | 13.00 | 13.00 | 14.00 | 15.00 | 15.50 | 23.00 | 20.50 | 19.50 | 20.00 | 20.50 | 19.50 | 20.00 | 19.00 | 16.00 | 17.50 | 19.00 |
| Detroit, Mich. | 17.85 | 12.85 | 12.85 | 13.85 | 14.85 | 15.35 | 22.85 | 20.35 | 19.35 | 19.85 | 20.35 | 19.35 | 19.85 | 18.85 | 15.85 | 17.35 | 18.85 |
| Toledo, Ohio | ..... | 12.85 | 12.85 | 13.85 | 14.85 | 15.35 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| St. Louis, Mo. | 17.50 | 12.50 | 12.50 | 13.50 | 14.50 | 15.00 | 22.50 | 20.00 | 19.00 | 19.50 | 20.00 | 19.00 | 19.50 | 18.50 | 15.50 | 17.00 | 18.50 |
| Atlanta, Ga.; Alabama City, Ala.; Birmingham, Los Angeles; Pittsburg, Cal.; San Francisco | 17.00 | 12.00 | 12.00 | 13.00 | 14.00 | 14.50 | 22.00 | 19.50 | 18.50 | 19.00 | 19.50 | 18.50 | 19.00 | 18.00 | 15.00 | 16.50 | 18.00 |
| Minnequa, Colo. | 16.50 | 11.50 | 11.50 | 12.50 | 13.50 | 14.00 | 21.50 | 19.00 | 18.00 | 18.50 | 19.00 | 18.00 | 18.50 | 17.50 | 14.50 | 16.00 | 17.50 |
| Seattle, Wash. | 14.50 | 9.50 | 9.50 | 10.50 | 11.50 | 12.00 | 19.50 | 17.00 | 16.00 | 16.50 | 17.00 | 16.00 | 16.00 | 15.00 | 12.50 | 14.00 | 15.50 |

*Baled turnings are $5 per gross ton higher.

**BUNDLES:** Tin can bundles are $4 below dealers' No. 2 bundles No. 3 bundles are $2 less than No. 1 heavy melting.

**AT NEW YORK CITY** or Brooklyn, the maximum shipping point price is $15.33 for No. 1 heavy melting, f.o.b. cars, f.a.s. vessel or loaded on truck. Minimum set at $14 per grosston at any shipping point in U. S. Other grades carry differentials similar to those in table. New Jersey prices must be computed on basis of all-rail. At Boston the maximum is $15.05 for No. 1 f.o.b. cars, f.a.s. vessel or loaded on trucks. Shipments from a New England shipping point to a consumer outside New England carry maximum transportation charge of $6.66 per ton.

**SWITCHING CHARGES:** Deductions for shipping points within basing points (cents per gross ton) are: Pittsburgh, Brackenridge, 55c.; Midland, Johnstown, Sharon, Youngstown, Warren, Weirton, Cleveland, Toledo, Los Angeles, San Francisco, 42c.; Butler, Monessen, Canton, Steubenville, Cincinnati*, Portsmouth, Ashland, Coatesville, Harrisburg, Phoenixville, Bethlehem, Kokomo, Duluth, St. Louis, 28c.; Buffalo, Claymont, 36c.; Conshohocken, 11c.; Atlanta, Birmingham, 32c.; Pittsburg, Cal., 42c.; Middletown, 14c.; Sparrow's Point, 11c.; Chicago, 84c.; Detroit, 53c.; Alabama City, 26c.; Minnequa, 22c.; Seattle, 38c. *At Cincinnati, for basic open hearth grades, foundry steel and auto springs and crankshafts, deduct 80c. per ton.

**PITTSBURGH** basing point includes switching districts of Bessemer, Homestead, Duquesne, Munhall and McKeesport, Cincinnati basing point includes Newport, Ky., switching district. St. Louis includes switching districts of Granite City, East St. Louis, Madison, Ill. San Francisco includes switching districts of S. San Francisco, Niles and Oakmont, Cal. Claymont, Del., includes the switching point of Chester, Pa. Chicago includes Gary, Ind., switching district.

**MAXIMUM SHIPPING POINT PRICE**—Where shipment is by rail or vessel, or by combination of rail and vessel, the scrap is at its shipping point when placed f.o.b. railroad or f.a.s. vessel. In such cases, the maximum shipping point prices shall be: (a) For shipping points located within a basing point, the price listed in the table above for the scrap at the basing point in which the shipping point is located, minus the lowest established switching charge for scrap within the basing point and (b) for shipping points located outside the basing point, the price in table above at the most favorable basing point minus the lowest transportation charge by rail or water or combination thereof. In lieu of dock charge add 75c. a ton*, but 50c. if moved by deck scow or railroad lighter. Shipping by motor vehicle: The scrap is at its shipping point when loaded. For shipping points located within basing points take price listed in table minus applicable switching charge. If located outside a basing point, the price at the most favorable basing point minus lowest established charge for transporting by common carrier. If no established transportation rate exists, the customary costs are deducted. Published dock charges prevail. If unpublished include 75c.* For exceptions see official order.

**UNPREPARED SCRAP:** For unprepared scrap, maximum prices shall be $3.50 (and in the case of the material from which No. 1, No. 2, and No. 3 bundles are made $4) less maximum prices for the corresponding grade or grades of prepared scrap. In no case, however, shall electric furnace and foundry grades be used as the "corresponding grade or grades of prepared scrap." Converter may charge $2.50 per ton on consumer-owned unprepared remote scrap (see order). A preparation-in-transit charge for allocated unprepared scrap is provided.

**NEW LISTED GRADES:** Priced in dollars per gross ton less than No. 1 heavy melting steel. Pit scrap, ladle skulls, slag reclaim, etc., of 85% or more Fe priced—$2; 75 to 85% Fe—$4; under 75% Fe—$8 per ton. Mill scale of 65% or more Fe—$8 per ton. Mill cinder and grindings, shipping point maximum price of $4 per gross ton at all U. S. shipping points.

**CHEMICAL BORINGS:** No. 1 (new, clean, containing not more than 1 per cent oil), $1 less than No. 1 heavy melting; No. 2 (new, clean, containing not more than 1.5 per cent oil), $2 less than No. 1 heavy melting. If loaded in box cars add 75c.

*At Memphis 50c.; Great Lakes ports $1; New England $1.25.

### RAILROAD SCRAP

| | No. 1 RR Heavy Melting | Scrap Rails | Rails for Rerolling | Scrap Rails: 3 ft. and Under | Scrap Rails: 2 ft. and Under | Scrap Rails: 18 in. and Under |
|---|---|---|---|---|---|---|
| Cleveland, Cincinnati, Ashland, Portsmouth, Middletown | $20.50 | $21.50 | $23.00 | $23.50 | $23.75 | $24.00 |
| Canton, Pittsburgh, Sharon, Steubenville, Wheeling, Youngstown | 21.00 | 22.00 | 23.50 | 24.00 | 24.25 | 24.50 |
| Chicago, Philadelphia, Sparrows Pt., Wilmington | 19.75 | 20.75 | 22.25 | 22.75 | 23.00 | 23.25 |
| Birmingham, Los Angeles, San Francisco | 18.00 | 19.00 | 20.50 | 21.00 | 21.25 | 21.50 |
| Buffalo | 20.25 | 21.25 | 22.75 | 23.25 | 23.50 | 23.75 |
| Detroit | 18.85 | 19.85 | 21.35 | 21.85 | 22.10 | 22.35 |
| Duluth | 19.00 | 20.00 | 21.50 | 22.00 | 22.25 | 22.50 |
| Kansas City, Mo. | 17.00 | 18.00 | 19.50 | 20.00 | 20.25 | 20.50 |
| Kokomo, Ind. | 19.25 | 20.25 | 21.75 | 22.25 | 22.50 | 22.75 |
| Seattle | 15.50 | 16.50 | 18.00 | 18.50 | 18.75 | 19.00 |
| St. Louis | 18.50 | 19.50 | 21.00 | 21.50 | 21.75 | 22.00 |

### CAST IRON SCRAP

| | Group A | Group B | Group C |
|---|---|---|---|
| No. 1 cupola cast | $18.00 | $19.00 | $20.00 |
| Clean auto cast | 18.00 | 19.00 | 20.00 |
| Unstripped motor blocks | 15.50 | 16.50 | 17.50 |
| Stove Plate | 17.00 | 18.00 | 19.00 |
| Heavy Breakable Cast | 15.50 | 16.50 | 17.50 |
| Charging Box Size Cast | 17.00 | 18.00 | 19.00 |
| Misc. Malleable | 20.00 | 21.00 | 22.00 |

Group A includes the states of Montana, Idaho, Wyoming, Nevada, Utah, Arizona and New Mexico.

Group B includes the states of North Dakota, South Dakota, Nebraska, Colorado, Kansas, Oklahoma, Texas and Florida.

Group C: States not named in A and B; switching district of Kansas City, Kan., Mo.

## Tool Steel Scrap Ceiling Prices Set by MPR 379, May 4, 1943

**BASE PRICE SEGREGATED**

| | Solids, Lb. Cont. W | Turnings, Lb. Cont. W |
|---|---|---|
| Type 1 | $1.80 | $1.60 |
| Type 2 | 1.60 | 1.40 |
| Type 3 | 1.25 | 1.25 |
| Type 4* | 0.125 | 0.105 |
| Type 5* | 0.135 | 0.115 |

*Per lb. of scrap material.

**BASE PRICE UNSEGREGATED SOLIDS**

$1.50 per lb. contained W if 5% or more.

$1.15 per lb. contained W if over 1% and less than 5%.

$0.80 per lb. contained Mo if 1½% or more.

**BASE PRICE UNSEGREGATED TURNINGS**

$1.30 per lb. contained W if 5% or more.

$1.00 per lb. contained W if 1% and less than 5%.

$0.70 per lb. contained Mo if 1½% or more.

# Comparison of Prices . . .

Advances Over Past Week in **Heavy Type**; Declines in *Italics*. [Prices Are F.O.B. Major Basing Points]

| | Sept. 28, 1943 | Sept. 21, 1943 | Aug. 31, 1943 | Sept. 29, 1942 |
|---|---|---|---|---|
| **Flat Rolled Steel:** (Cents Per Lb.) | | | | |
| Hot rolled sheets | 2.10 | 2.10 | 2.10 | 2.10 |
| Cold rolled sheets | 3.05 | 3.05 | 3.05 | 3.05 |
| Galvanized sheets (24 ga.) | 3.50 | 3.50 | 3.50 | 3.50 |
| Hot rolled strip | 2.10 | 2.10 | 2.10 | 2.10 |
| Cold rolled strip | 2.80 | 2.80 | 2.80 | 2.80 |
| Plates | 2.10 | 2.10 | 2.10 | 2.10 |
| Plates, wrought iron | 3.80 | 3.80 | 3.80 | 3.80 |
| Stain's c.r. strip (No. 302) | 28.00 | 28.00 | 28.00 | 28.00 |
| **Tin and Terne Plate:** (Dollars Per Base Box) | | | | |
| Tin plate, standard cokes | $5.00 | $5.00 | $5.00 | $5.00 |
| Tin plate, electrolytic | 4.50 | 4.50 | 4.50 | 4.50 |
| Special coated mfg. ternes | 4.30 | 4.30 | 4.30 | 4.30 |
| **Bars and Shapes:** (Cents Per Lb.) | | | | |
| Merchant bars | 2.15 | 2.15 | 2.15 | 2.15 |
| Cold finished bars | 2.65 | 2.65 | 2.65 | 2.65 |
| Alloy bars | 2.70 | 2.70 | 2.70 | 2.70 |
| Structural shapes | 2.10 | 2.10 | 2.10 | 2.10 |
| Stainless bars (No. 302) | 24.00 | 24.00 | 24.00 | 24.00 |
| Wrought iron bars | 4.40 | 4.40 | 4.40 | 4.40 |
| **Wire and Wire Products:** (Cents Per Lb.) | | | | |
| Plain wire | 2.60 | 2.60 | 2.60 | 2.60 |
| Wire nails | 2.55 | 2.55 | 2.55 | 2.55 |
| **Rails:** (Dollars Per Gross Ton) | | | | |
| Heavy rails | $40.00 | $40.00 | $40.00 | $40.00 |
| Light rails | 40.00 | 40.00 | 40.00 | 40.00 |
| **Semi-Finished Steel:** (Dollars Per Gross Ton) | | | | |
| Rerolling billets | $34.00 | $34.00 | $34.00 | $34.00 |
| Sheet bars | 34.00 | 34.00 | 34.00 | 34.00 |
| Slabs | 34.00 | 34.00 | 34.00 | 34.00 |
| Forging billets | 40.00 | 40.00 | 40.00 | 40.00 |
| Alloy blooms, billets, slabs | 54.00 | 54.00 | 54.00 | 54.00 |
| **Wire Rods and Skelp:** (Cents Per Lb.) | | | | |
| Wire rods | 2.00 | 2.00 | 2.00 | 2.00 |
| Skelp (grvd) | 1.90 | 1.90 | 1.90 | 1.90 |

| | Sept. 28, 1943 | Sept. 21, 1943 | Aug. 31, 1943 | Sept. 29, 1942 |
|---|---|---|---|---|
| **Pig Iron:** (Per Gross Ton) | | | | |
| No. 2 fdy., Philadelphia | $25.84 | $25.84 | $25.89 | $25.89 |
| No. 2, Valley furnace | 24.00 | 24.00 | 24.00 | 24.00 |
| No. 2, Southern Cin'ti | 24.68 | 24.68 | 24.68 | 24.68 |
| No. 2, Birmingham | 20.38 | 20.38 | 20.38 | 20.38 |
| No. 2, foundry, Chicago† | 24.00 | 24.00 | 24.00 | 24.00 |
| Basic, del'd eastern Pa. | 25.39 | 25.39 | 25.39 | 25.39 |
| Basic, Valley furnace | 23.50 | 23.50 | 23.50 | 23.50 |
| Malleable, Chicago† | 24.00 | 24.00 | 24.00 | 24.00 |
| Malleable, Valley | 24.00 | 24.00 | 24.00 | 24.00 |
| L. S. charcoal, Chicago | 31.34 | 31.34 | 31.34 | 31.34 |
| Ferromanganese‡ | 135.00 | 135.00 | 135.00 | 135.00 |

†The switching charge for delivery to foundries in the Chicago district is 60c. per ton.
‡For carlots at seaboard.

| | | | | |
|---|---|---|---|---|
| **Scrap:** (Per Gross Ton) | | | | |
| Heavy melt'g steel, P'gh. | $20.00 | $20.00 | $20.00 | $20.00 |
| Heavy melt'g steel, Phila. | 18.75 | 18.75 | 18.75 | 18.75 |
| Heavy melt'g steel, Ch'go | 18.75 | 18.75 | 18.75 | 18.75 |
| No. 1 hy. comp. sheet, Det. | 17.85 | 17.85 | 17.85 | 17.85 |
| Low phos. plate, Youngs'n | 22.50 | 22.50 | 22.50 | 22.50 |
| No. 1 cast, Pittsburgh | 20.00 | 20.00 | 20.00 | 20.00 |
| No. 1 cast, Philadelphia | 20.00 | 20.00 | 20.00 | 20.00 |
| No. 1 cast, Ch'go | 20.00 | 20.00 | 20.00 | 20.00 |
| **Coke, Connellsville:** (Per Net Ton at Oven) | | | | |
| Furnace coke, prompt | $6.50 | $6.50 | $6.50 | $6.00 |
| Foundry coke, prompt | 7.50 | 7.375 | 6.875 | 6.875 |
| **Non-Ferrous Metals:** (Cents per Lb. to Large Buyers) | | | | |
| Copper, electro., Conn. | 12.00 | 12.00 | 12.00 | 12.00 |
| Copper, Lake, New York | 12.00 | 12.00 | 12.00 | 12.00 |
| Tin (Straits), New York | 52.00 | 52.00 | 52.00 | 52.00 |
| Zinc, East St. Louis | 8.25 | 8.25 | 8.25 | 8.25 |
| Lead, St. Louis | 6.35 | 6.35 | 6.35 | 6.35 |
| Aluminum, Virgin, del'd. | 15.00 | 15.00 | 15.00 | 15.00 |
| Nickel, electrolytic | 35.00 | 35.00 | 35.00 | 35.00 |
| Magnesium, ingot | 20.50 | 20.50 | 20.50 | 22.50 |
| Antimony (Asiatic), N. Y. | 16.50 | 16.50 | 16.50 | 16.50 |

The various basing points for finished and semi-finished steel are listed in the detailed price tables, pages 112-125.

# Composite Prices . . .

| | FINISHED STEEL | PIG IRON | SCRAP STEEL |
|---|---|---|---|
| Sept. 28, 1943 | 2.25513c. a Lb. | 23.61 a Gross Ton | $19.17 a Gross Ton |
| One week ago | 2.25513c. a Lb. | 23.61 a Gross Ton | $19.17 a Gross Ton |
| One month ago | 2.25513c. a Lb. | 23.61 a Gross Ton | $19.17 a Gross Ton |
| One year ago | 2.26190c. a Lb. | 23.61 a Gross Ton | $19.17 a Gross Ton |

| | FINISHED STEEL HIGH | FINISHED STEEL LOW | PIG IRON HIGH | PIG IRON LOW | SCRAP STEEL HIGH | SCRAP STEEL LOW |
|---|---|---|---|---|---|---|
| 1943 | 2.25513c., | 2.25513c., | $23.61 | $23.61 | $19.17 | $19.17 |
| 1942 | 2.26190c., | 2.26190c., | 23.61 | 23.61 | 19.17 | 19.17 |
| 1941 | 2.43078c., | 2.43078c., | $23.61, Mar. 20 | $23.45, Jan. 2 | $22.00, Jan. 7 | $19.17, Apr. 10 |
| 1940 | 2.30467c., Jan. 2 | 2.24107c., Apr. 16 | 23.45, Dec. 23 | 22.61, Jan. 2 | 21.83, Dec. 30 | 16.04, Apr. 9 |
| 1939 | 2.35367c., Jan. 3 | 2.26689c., May 16 | 22.61, Sept. 19 | 20.61, Sept. 12 | 22.50, Oct. 3 | 14.08, May 16 |
| 1938 | 2.58414c., Jan. 4 | 2.27207c., Oct. 18 | 23.25, June 21 | 19.61, July 6 | 15.00, Nov. 22 | 11.00, June 7 |
| 1937 | 2.58414c., Mar. 9 | 2.32263c., Jan. 4 | 23.25, Mar. 9 | 20.25, Feb. 16 | 21.92, Mar. 30 | 12.67, June 9 |
| 1936 | 2.32263c., Dec. 28 | 2.05200c., Mar. 10 | 19.74, Nov. 24 | 18.73, Aug. 11 | 17.75, Dec. 21 | 12.67, June 9 |
| 1935 | 2.07642c., Oct. 1 | 2.06492c., Jan. 8 | 18.84, Nov. 5 | 17.83, May 14 | 13.42, Dec. 10 | 10.33, Apr. 29 |
| 1934 | 2.15367c., Apr. 24 | 1.95757c., Jan. 2 | 17.90, May 1 | 16.90, Jan. 27 | 13.00, Mar. 13 | 9.50, Sept. 25 |
| 1933 | 1.95578c., Oct. 3 | 1.75836c., May 2 | 16.90, Dec. 5 | 13.56, Jan. 3 | 12.25, Aug. 8 | 6.75, Jan. 3 |
| 1932 | 1.89196c., July 5 | 1.83901c., Mar. 1 | 14.81, Jan. 5 | 13.56, Dec. 6 | 8.50, Jan. 12 | 6.43, July 5 |
| 1931 | 1.99626c., Jan. 13 | 1.86586c., Dec. 29 | 15.90, Jan. 6 | 14.79, Dec. 15 | 11.33, Jan. 6 | 8.50, Dec. 29 |
| 1930 | 2.25488c., Jan. 7 | 1.97319c., Dec. 9 | 18.21, Jan. 7 | 15.90, Dec. 16 | 15.00, Feb. 18 | 11.25, Dec. 9 |
| 1929 | 2.31773c., May 28 | 2.26498c., Oct. 29 | 18.71, May 14 | 18.21, Dec. 17 | 17.58, Jan. 29 | 14.08, Dec. 3 |

Weighted index based on steel bars, beams, tank plates, wire, rails, black pipe, hot and cold-rolled sheets and strip, representing 78 per cent of the United States output. Index recapitulated in Aug. 28, 1941, issue.

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Southern iron at Cincinnati.

Based on No. 1 heavy melting steel scrap quotations to consumers at Pittsburgh, Philadelphia and Chicago.

# . . . Prices of Finished Iron and Steel

Steel prices shown here are f.o.b. basing points, in cents per lb., unless otherwise indicated. On some products either quantity deductions or quantity extras apply. In many cases gage, width, mutting, physical, chemical extras, etc., apply to the base price. Actual realized prices to the mill, therefore, are affected by extras, reductions, and in most cases freight absorbed to meet competition. Delivered prices do not reflect new 3 per cent tax on freight rates.

| Basing Point → / Product ↓ | Pittsburgh | Chicago | Gary | Cleveland | Birmingham | Buffalo | Youngstown | Sparrows Point | Granite City | Middletown, Ohio | Gulf Ports, Cars | Pacific Ports, Cars[10] | DELIVERED TO Detroit | New York | Philadelphia |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **SHEETS** | | | | | | | | | | | | | | | |
| Hot rolled | 2.10¢ | 2.10¢ | 2.10¢ | 2.10¢ | 2.10¢ | 2.10¢ | 2.10¢ | 2.10¢ | 2.20¢ | 2.10¢ | | 2.65¢ | 2.20¢ | 2.34¢ | 2.27¢ |
| Cold rolled[1] | 3.05¢ | 3.05¢ | 3.05¢ | 3.05¢ | | 3.05¢ | 3.05¢ | | 3.15¢ | 3.05¢ | | 3.70¢ | 3.15¢ | 3.39¢ | 3.37¢ |
| Galvanized (24 ga.) | 3.50¢ | 3.50¢ | 3.50¢ | | 3.50¢ | 3.50¢ | 3.50¢ | 3.50¢ | 3.60¢ | 3.50¢ | | 4.05¢ | | 3.74¢ | 3.67¢ |
| Enameling (20 ga.) | 3.35¢ | 3.35¢ | 3.35¢ | 3.35¢ | | | 3.35¢ | | 3.45¢ | 3.35¢ | | 4.00¢ | 3.45¢ | 3.71¢ | 3.67¢ |
| Long ternes[2] | 3.80¢ | | 3.80¢ | | | | | | | | | 4.55¢ | | 4.16¢ | 4.12¢ |
| **STRIP** | | | | | | | | | | | | | | | |
| Hot rolled[3] | 2.10¢ | 2.10¢ | 2.10¢ | 2.10¢ | 2.10¢ | | 2.10¢ | | | 2.10¢ | | 2.75¢ | 2.20¢ | 2.46¢ | |
| Cold rolled[4] | 2.80¢ | 2.90¢ | | 2.80¢ | | | 2.80¢ | (Worcester = 3.00¢) | | | | | 2.90¢ | 3.16¢ | |
| Cooperage stock | 2.20¢ | 2.20¢ | | | 2.20¢ | | 2.20¢ | | | | | | | 2.56¢ | |
| Commodity C-R | 2.95¢ | 3.05¢ | | 2.95¢ | | | 2.95¢ | (Worcester = 3.35¢) | | | | | 3.05¢ | 3.31¢ | |
| **TIN MILL PRODUCTS** | | | | | | | | | | | | | | | |
| Coke tin plate, base box | $5.00 | $5.00 | $5.00 | | | | | | $5.10 | | | | | 5.36¢ | 5.32¢ |
| .50 } Electro tin plate, box | $4.50 | $4.50 | $4.50 | | | | | | | | | | | | |
| .75 } Electro tin plate, box | $4.65 | | $4.65 | | | | | | | | | | | | |
| Black plate, 29 gage[5] | 3.05¢ | 3.05¢ | 3.05¢ | | | | | | 3.15¢ | | | 4.05¢[12] | | | 3.37¢ |
| Mfg. ternes, special box | $4.30 | $4.30 | $4.30 | | | | | | $4.40 | | | | | | |
| **BARS** | | | | | | | | | | | | | | | |
| Carbon steel | 2.15¢ | 2.15¢ | 2.15¢ | 2.15¢ | 2.15¢ | 2.15¢ | | (Duluth = 2.25¢) | | | 2.50¢ | 2.80¢ | 2.25¢ | 2.49¢ | 2.47¢ |
| Rail steel[6] | 2.15¢ | 2.15¢ | 2.15¢ | 2.15¢ | 2.15¢ | 2.15¢ | | | | | 2.50¢ | 2.80¢ | | | |
| Reinforcing (billet)[7] | 2.15¢ | 2.15¢ | 2.15¢ | 2.15¢ | 2.15¢ | 2.15¢ | 2.15¢ | 2.15¢ | | | 2.50¢ | 2.55¢[13] | 2.25¢ | 2.39¢ | |
| Reinforcing (rail)[7] | 2.15¢ | 2.15¢ | 2.15¢ | 2.15¢ | 2.15¢ | 2.15¢ | 2.15¢ | | | | 2.50¢ | 2.55¢[13] | 2.25¢ | | 2.47¢ |
| Cold finished[8] | 2.65¢ | 2.65¢ | 2.65¢ | 2.65¢ | | 2.65¢ | | | (Detroit = 2.70¢) | | | | | 2.99¢ | 2.97¢ |
| Alloy, hot rolled | 2.70¢ | 2.70¢ | | | | 2.70¢ | (Bethlehem, Massillon, Canton = 2.70¢) | | | | | | 2.80¢ | | |
| Alloy, cold drawn | 3.35¢ | 3.35¢ | 3.35¢ | 3.35¢ | | 3.35¢ | | | | | | | 3.45¢ | | |
| **PLATES** | | | | | | | | (Coatesville and Claymont = 2.10¢) | | | | | | | |
| Carbon steel | 2.10¢ | 2.10¢ | 2.10¢ | 2.10¢ | 2.10¢ | | 2.10¢ | 2.10¢ | 2.35¢ | | 2.45¢ | 2.65¢ | 2.31¢ | 2.29¢ | 2.15¢ |
| Floor plates | 3.35¢ | 3.35¢ | | | | | | | | | 3.70¢ | 4.00¢ | | 3.71¢ | 3.67¢ |
| Alloy | 3.50¢ | 3.50¢ | | | (Coatesville = 3.50¢) | | | | | | 3.95¢ | 4.15¢ | | 3.70¢ | 3.59¢ |
| **SHAPES** | | | | | | | | | | | | | | | |
| Structural | 2.10¢ | 2.10¢ | 2.10¢ | | 2.10¢ | 2.10¢ | (Bethlehem = 2.10¢) | | | | 2.45¢ | 2.75¢ | | 2.27¢ | 2.215¢ |
| **SPRING STEEL, C-R** | | | | | | | | | | | | | | | |
| 0.26 to 0.50 Carbon | 2.80¢ | | | 2.80¢ | | | (Worcester = 3.00¢) | | | | | | | | |
| 0.51 to 0.75 Carbon | 4.30¢ | | | 4.30¢ | | | (Worcester = 4.50¢) | | | | | | | | |
| 0.76 to 1.00 Carbon | 6.15¢ | | | 6.15¢ | | | (Worcester = 6.35¢) | | | | | | | | |
| 1.01 to 1.25 Carbon | 8.35¢ | | | 8.35¢ | | | (Worcester = 8.55¢) | | | | | | | | |
| **WIRE[9]** | | | | | | | | | | | | | | | |
| Bright[15] | 2.60¢ | 2.60¢ | | 2.60¢ | 2.60¢ | | (Worcester = 2.70¢) | | | | | 3.10¢ | | | 2.92¢ |
| Galvanized | add proper size extra and galvanized extra to bright wire base, above. | | | | | | | | | | | | | | |
| Spring (High Carbon) | 3.20¢ | 3.20¢ | | 3.20¢ | | | (Worcester = 3.30¢) | | | | | 3.70¢ | | | 3.52¢ |
| **PILING** | | | | | | | | | | | | | | | |
| Steel sheet | 2.40¢ | 2.40¢ | | | | 2.40¢ | | | | | | 2.95¢ | | | 2.72¢ |

[1] Mill run sheets are 10c per 100 lb. less than base; and primes only, 25c. above base. [2] Unassorted 8-lb. coating. [3] Widths up to 12 in. [4] Carbon 0.25 per cent and less. [5] Applies to certain width and length limitations. [6] For merchant trade. [7] Prices for straight length material only, from a producer to a consumer. Functional discount of 25c. per 100 lb. to fabricators. [8] Also shafting. For quantities of 20,000 to 29,999 lb. [9] Carload lot to manufacturing trade. [10] These prices do not apply if the customary means of transportation (rail and water) are not used. [12] Boxed. [13] Portland and Seattle price, San Francisco price is 2.50c. [14] This bright wire base price to be used in figuring annealed and bright finish wires, commercial spring wire and galvanized wire.

GOVERNMENT CEILING—Price Schedule No. 6 issued April 16, 1941, governs steel mill prices; Price Schedule No. 49 governs warehouse prices which are on another page of this issue.

EXCEPTIONS TO PRICE SCHEDULE No. 6—On hot rolled carbon bars, Phoenix Iron Co. may quote 2.35c. at established basing points, Calumet Steel division of Borg Warner may quote 2.35c., Chicago, on bars from its 8-in. mill; Joslyn Mfg. Co. may quote 2.35c., Chicago base. On rail steel bars Sweets Steel Co. may quote 2.35c., f.o.b. mill. On hot rolled sheets, Andrews Steel Co. may quote for shipment to Detroit area on Middletown base; Parkersburg Iron & Steel may quote $2.25 per hundred f.o.b. Parkersburg, W. Va. On galvanized sheets, Andrews Steel may quote 3.75c., at established basing points; Parkersburg Iron & Steel may quote $3.85 per hundred f.o.b. Parkersburg, W. Va. On hot rolled strip, Joslyn Mfg. Co. may quote 2.30c., Chicago base. On plates, Granite City Steel Co. may quote 2.35c., f.o.b. mill, and Central Iron & Steel Co. may quote 2.20c., f.o.b. basing points. On shapes, Phoenix Iron Co. may quote 2.30c. established basing points and 2.50c. Phoenixville for export.

On rail steel merchant bars, Eckels-Nye Corp. may charge 2.40c. On tubing, South Chester Tube Co. may price Gulf or Pacific Coast all-rail shipments and shipments west of Harrisburg on basis of f.o.b. Chester. On lend-lease sales to eastern seaboard, Sheffield Steel Co. and Colorado Fuel & Iron Corp. may sell f.o.b. mill. SEMIFINISHED STEEL—Follansbee Steel Corp. may sell forging billets at $40.50 f.o.b. Toronto; Continental Steel Corp. may sell Acme Steel Co. at $34 for rerolling billets plus extras and freight; Ford Motor Co. may sell rerolling billets at $34 f.o.b. Dearborn; Andrews Steel Co. may sell forging billets at $50 at established basing points and slabs at $41; Empire Sheet and Tin Plate may sell slabs at $41 at established basing points and sheet bars at $39 f.o.b. mill; on lend-lease sales Northwestern Steel & Wire Co. may charge $41 per gross ton f.o.b. mill for rerolling billets; on lend-lease sales Wheeling Steel Corp. may charge $36 per ton for small billets, f.o.b. Portsmouth and $37 per ton for sheet bars f.o.b. Portsmouth; Laclede Steel Co. on semi-finished sales for lend-lease shipped to eastern seaboard may use Chicago basing point prices f.o.b. Alton and Madison, Ill. ALLOY STEEL BARS—Texas Steel Co. may use Chicago base f.o.b. Fort Worth.

## WAREHOUSE PRICES

*(Delivered Metropolitan areas, per 100 lb. These prices do not necessarily apply for dislocated tonnage shipments when the f.o.b. City prices are used in conformance with OPA Schedule 49)*

| Cities | SHEETS | | | STRIP | | Plates ¼ in. and heavier | Structural Shapes | BARS | | ALLOY BARS | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Hot Rolled (10 gage) | Cold Rolled | Galvanized (24 gage) | Hot Rolled | Cold Rolled | | | Hot Rolled | Cold Finished | †† Hot Rolled, 2300 | ‡ Hot Rolled, 3100 | †† Cold Drawn, 2300 | ‡ Cold Drawn, 3100 |
| *Philadelphia | $3.518 | $4.872[5] | $5.018 | $3.922 | $4.772 | $3.605 | $3.666 | $3.822 | $4.072 | .... | $7.116 | .... | .... |
| *New York | 3.590 | 4.613[2] | 5.010 | 3.974[6] | 4.774 | 3.768 | 3.758 | 3.853 | 4.103 | 6.008 | 7.158 | 7.303 | 8.453 |
| *Boston | 3.774 | 4.744 | 5.224 | 4.106 | 4.715 | 3.912 | 3.912 | 4.044 | 4.144 | 6.162 | 7.312 | 7.344 | 8.494 |
| *Baltimore | 3.394 | 4.852 | 4.894 | 3.902 | 4.752 | 3.594 | 3.759 | 3.802 | 4.052 | .... | .... | .... | .... |
| *Norfolk | 3.771 | 4.965 | 5.371 | 4.165 | 4.865 | 3.971 | 4.002 | 4.065 | 4.165 | .... | .... | .... | .... |
| *Washington | 3.596 | 4.841 | 5.196 | 4.041 | 4.741 | 3.796 | 3.930 | 3.941 | 4.041 | .... | .... | .... | .... |
| *Chicago | 3.25 | 4.20 | 5.23[4] | 3.60 | 4.65[5] | 3.55 | 3.55 | 3.50 | 3.75 | 5.75 | 6.90 | 6.85 | 8.00 |
| *Milwaukee | 3.387 | 4.337[2] | 5.272[4] | 3.737 | 4.787[5] | 3.687 | 3.687 | 3.637 | 3.887 | 5.987 | 7.137 | 7.087 | 8.237 |
| *Cleveland | 3.35 | 4.40 | 4.877[4] | 3.60 | 4.45 | 3.40 | 3.588 | 3.35 | 3.75 | 5.956 | 7.106 | 6.85 | 8.00 |
| *Buffalo | 3.35 | 4.40 | 4.75[4] | 3.819 | 4.669 | 3.63 | 3.40 | 3.35 | 3.75 | 5.75 | 6.90 | 6.85 | 8.00 |
| *Detroit | 3.45 | 4.50 | 5.00[4] | 3.70 | 5.909[6] | 3.609 | 3.661 | 3.45 | 3.80 | 6.08 | 7.23 | 7.159 | 8.309 |
| *Cincinnati | 3.425 | 4.475[2] | 4.825[1] | 3.675 | 4.711 | 3.611 | 3.691 | 3.611 | 4.011 | .... | .... | .... | .... |
| *St. Louis | 3.397 | 4.247[2] | 5.172[4] | 3.747 | 4.931[5] | 3.697 | 3.697 | 3.647 | 4.031 | 6.131 | 7.281 | 7.231 | 8.381 |
| *Pittsburgh | 3.35 | 4.40 | 4.75 | 3.60 | 4.45 | 3.40 | 3.40 | 3.35 | 3.75 | 5.75 | 7.15 | 6.85 | 8.25 |
| *St. Paul | 3.51 | 4.46 | 5.257[4] | 3.86 | 4.35[5] | 3.81[9] | 3.81[9] | 3.76[9] | 4.361 | 6.09 | 7.24 | 7.561 | 8.711 |
| *Omaha | 3.865 | 5.443 | 5.608[4] | 4.215 | .... | 4.165 | 4.165 | 4.115 | 4.443 | .... | .... | .... | .... |
| *Indianapolis | 3.58 | 3.58 | 4.568 | 4.918 | 3.768 | 4.78 | 3.63 | 3.58 | 3.98 | 6.08 | 7.23 | 7.18 | 8.33 |
| Birmingham | 3.45[3] | .... | 4.75[1] | 3.70[3] | .... | 3.55[3] | 3.55[3] | 3.50[3] | 4.43 | .... | .... | .... | .... |
| Memphis | 3.85 | 4.66 | 5.25 | 4.10 | .... | 3.95 | 3.95 | 3.90 | 4.31 | .... | .... | .... | .... |
| New Orleans | 3.95 | 4.95 | 5.25 | 4.20 | .... | 3.90 | 3.90 | 4.10 | 4.60 | .... | .... | .... | .... |
| Houston | 3.75 | 5.43 | 5.25 | 4.30 | .... | 5.25 | 5.25 | 3.75 | 4.50 | .... | .... | .... | .... |
| †Los Angeles | 4.95 | 7.15 | 5.95 | 4.90 | .... | 4.90 | 4.60 | 4.35 | 5.70 | 9.55 | 8.55 | 10.55 | 9.55 |
| †San Francisco | 4.55 | 7.55 | 6.60 | 4.50 | .... | 4.65 | 4.35 | 3.95 | 5.55 | 9.80 | 8.80 | 10.80 | 9.80 |
| †Seattle | 4.65[7] | 6.63 | 5.70[7] | 4.25 | .... | 4.75 | 4.45 | 4.20 | 5.75 | .... | 8.00 | .... | .... |

## NATIONAL EMERGENCY (N. E.) STEELS

*(Hot Rolled Mill Extras for Alloy Content)*

| Designation | CHEMICAL COMPOSITION LIMITS, PER CENT | | | | | | | | Basic Open-Hearth | | Electric Furnace | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Carbon | Manganese | Phosphorus Max. | Sulphur Max. | Silicon | Chromium | Nickel | Molybdenum | Bars and Bar Strip | Billets, Blooms and Slabs | Bars and Bar Strip | Billets, Blooms and Slabs |
| NE 1330 | .28/ .33 | 1.60/1.90 | .040 | .040 | .20/ .35 | .... | .... | .... | .10c | $2.00 | .... | .... |
| NE 1335 | .33/ .38 | 1.60/1.90 | .040 | .040 | .20/ .35 | .... | .... | .... | .10 | 2.00 | .... | .... |
| NE 1340 | .38/ .43 | 1.60/1.90 | .040 | .040 | .20/ .35 | .... | .... | .... | .10 | 2.00 | .... | .... |
| NE 1345 | .43/ .48 | 1.60/1.90 | .040 | .040 | .20/ .35 | .... | .... | .... | .10 | 2.00 | .... | .... |
| NE 1350 | .48/ .53 | 1.60/1.90 | .040 | .040 | .20/ .35 | .... | .... | .... | .10 | 2.00 | .... | .... |
| NE 8613 | .12/ .17 | .70/ .90 | .040 | .040 | .20/ .35 | .40/ .60 | .40/ .70 | .15/ .25 | .75 | 15.00 | 1.25 | 25.00 |
| NE 8615 | .13/ .18 | .70/ .90 | .040 | .040 | .20/ .35 | .40/ .60 | .40/ .70 | .15/ .25 | .75 | 15.00 | 1.25 | 25.00 |
| NE 8617 | .15/ .20 | .70/ .90 | .040 | .040 | .20/ .35 | .40/ .60 | .40/ .70 | .15/ .25 | .75 | 15.00 | 1.25 | 25.00 |
| NE 8620 | .18/ .23 | .70/ .90 | .040 | .040 | .20/ .35 | .40/ .60 | .40/ .70 | .15/ .25 | .75 | 15.00 | 1.25 | 25.00 |
| NE 8630 | .28/ .33 | .70/ .90 | .040 | .040 | .20/ .35 | .40/ .60 | .40/ .70 | .15/ .25 | .75 | 15.00 | 1.25 | 25.00 |
| NE 8635 | .33/ .38 | .75/1.00 | .040 | .040 | .20/ .35 | .40/ .60 | .40/ .70 | .15/ .25 | .75 | 15.00 | 1.25 | 25.00 |
| NE 8637 | .35/ .40 | .75/1.00 | .040 | .040 | .20/ .35 | .40/ .60 | .40/ .70 | .15/ .25 | .75 | 15.00 | 1.25 | 25.00 |
| NE 8640 | .38/ .43 | .75/1.00 | .040 | .040 | .20/ .35 | .40/ .60 | .40/ .70 | .15/ .25 | .75 | 15.00 | 1.25 | 25.00 |
| NE 8642 | .40/ .45 | .75/1.00 | .040 | .040 | .20/ .35 | .40/ .60 | .40/ .70 | .15/ .25 | .75 | 15.00 | 1.25 | 25.00 |
| NE 8645 | .43/ .48 | .75/1.00 | .040 | .040 | .20/ .35 | .40/ .60 | .40/ .70 | .15/ .25 | .75 | 15.00 | 1.25 | 25.00 |
| NE 8650 | .48/ .53 | .75/1.00 | .040 | .040 | .20/ .35 | .40/ .60 | .40/ .70 | .15/ .25 | .75 | 15.00 | 1.25 | 25.00 |
| NE 8720 | .18/ .23 | .70/ .90 | .040 | .040 | .20/ .35 | .40/ .60 | .40/ .70 | .20/ .30 | .80 | 16.00 | 1.30 | 26.00 |
| NE 9255 | .50/ .60 | .70/ .95 | .040 | .040 | 1.80/2.20 | .... | .... | .... | .40 | 8.00 | .... | .... |
| NE 9260 | .55/ .65 | .75/1.00 | .040 | .040 | 1.80/2.20 | .... | .... | .... | .40 | 8.00 | .... | .... |
| NE 9261 | .55/ .65 | .75 /1.00 | .040 | .040 | 1.80/2.20 | .10/ .25 | .... | .... | .65 | 13.00 | .... | .... |
| NE 9262 | .55/ .65 | .75/1.00 | .040 | .040 | 1.80/2.20 | .25/ .40 | .... | .... | .65 | 13.00 | .... | .... |
| NE 9415 | .13/ .18 | .80/1.10 | .040 | .040 | .20/ .35 | .30/ .50 | .30/ .60 | .08/ .15 | .75 | 15.00 | 1.25 | $25.00 |
| NE 9420 | .18/ .23 | .80/1.10 | .040 | .040 | .20/ .35 | .30/ .50 | .30/ .60 | .08/ .15 | .75 | 15.00 | 1.25 | 25.00 |
| NE 9422 | .20/ .25 | .80/1.10 | .040 | .040 | .20/ .35 | .30/ .50 | .30/ .60 | .08/ .15 | .75 | 15.00 | 1.25 | 25.00 |
| NE 9425 | .23/ .28 | .80/1.10 | .040 | .040 | .20/ .35 | .30/ .50 | .30/ .60 | .08/ .15 | .75 | 15.00 | 1.25 | 25.00 |
| NE 9430 | .28/ .33 | .90/1.20 | .040 | .040 | .20/ .35 | .30/ .50 | .30/ .60 | .08/ .15 | .75 | 15.00 | 1.25 | 25.00 |
| NE 9435 | .33/ .38 | .90/1.20 | .040 | .040 | .20/ .35 | .30/ .50 | .30/ .60 | .08/ .15 | .75 | 15.00 | 1.25 | 25.00 |
| NE 9437 | .35/ .40 | .90/1.20 | .040 | .040 | .20/ .35 | .30/ .50 | .30/ .60 | .08/ .15 | .75 | 15.00 | 1.25 | 25.00 |
| NE 9440 | .38/ .43 | .90/1.20 | .040 | .040 | .20/ .35 | .30/ .50 | .30/ .60 | .08/ .15 | .75 | 15.00 | 1.25 | 25.00 |
| NE 9442 | .40/ .45 | 1.00/1.30 | .040 | .040 | .20/ .35 | .30/ .50 | .30/ .60 | .08/ .15 | .80 | 16.00 | 1.30 | 26.00 |
| NE 9445 | .43/ .48 | 1.00/1.30 | .040 | .040 | .20/ .35 | .30/ .50 | .30/ .60 | .08/ .15 | .80 | 16.00 | 1.30 | 26.00 |
| NE 9450 | .48/ .53 | 1.20/1.50 | .040 | .040 | .20/ .35 | .30/ .50 | .30/ .60 | .08/ .15 | .80 | 16.00 | 1.30 | 26.00 |
| NE 9537* | .35/ .40 | 1.20/1.50 | .040 | .040 | .40/ .60 | .40/ .60 | .40/ .70 | .15/ .25 | 1.20 | 24.00 | 1.70 | 34.00 |
| NE 9540* | .38/ .43 | 1.20/1.50 | .040 | .040 | .40/ .60 | .40/ .60 | .40/ .70 | .15/ .25 | 1.20 | 24.00 | 1.70 | 34.00 |
| NE 9542* | .40/ .45 | 1.20/1.50 | .040 | .040 | .40/ .60 | .40/ .60 | .40/ .70 | .15/ .25 | 1.20 | 24.00 | 1.70 | 34.00 |
| NE 9545* | .43/ .48 | 1.20/1.50 | .040 | .040 | .40/ .60 | .40/ .60 | .40/ .70 | .15/ .25 | 1.20 | 24.00 | 1.70 | 34.00 |
| NE 9550* | .48/ .53 | 1.20/1.50 | .040 | .040 | .40/ .60 | .40/ .60 | .40/ .70 | .15/ .25 | 1.20 | 24.00 | 1.70 | 34.00 |
| NE 9261 | .55/ .65 | .75/1.00 | .040 | .040 | 1.80/2.20 | .10/ .25 | .... | .... | .... | .... | .... | .... |
| NE 9425 | .23/ .28 | .80/1.10 | .040 | .040 | .20/ .35 | .30/ .50 | .30/ .60 | .08/ .15 | .... | .... | .... | .... |
| NE 9545 | .43/ .48 | 1.20/1.50 | .040 | .040 | .40/ .60 | .40/ .60 | .40/ .70 | .15/ .25 | .... | .... | .... | .... |

BASE QUANTITIES: Hot rolled sheets, cold rolled sheets, hot rolled strip, plates, shapes and hot rolled bars, 400 to 1999 lb.; galvanized sheets, 150 to 1499 lb.; cold rolled strip, extras apply on all quantities; cold finished bars, 1500 lb. and over; SAE bars, 1000 lb. and over: Exceptions: [1] 500 to 1499 lb. [2] 400 to 1499 lb. [3] 400 to 3999 lb. [4] 450 to 1499 lb. [5] 1000 to 1999 lb. [6] 0 to 1999 lb. [7] 300 to 10,000 lb. [8] 2000 to 39,999 lb. [9] 400 to 14,999 lb. At Philadelphia galvanized sheets, 2500 more bundles; Boston, cold rolled and galvanized sheets, 450 to 3749 lb.; San Francisco, hot rolled sheets, 400 to 39,999 lb.; galvanized and cold rolled sheets, 750 to 4999 lb.; cold fin. bars, 0-299 lb.; hot rolled alloy bars, 0-4999 lb.; Seattle, cold finished bars, 1000 lb. and over, hot rolled alloy bars, 0-1999 lb.; Memphis, hot rolled sheets, 400 to 1999 lb., galvanized sheets, 150 and over; Los Angeles, hot rolled sheets, bars, plates, cold rolled sheets, 300 to 1999 lb.; galvanized sheets, 1 to 6 bundles; cold finished bars, 1 to 99 lbs.; SAE bars, 100 lb. Extras for size, quality, etc., apply on above quotations.

† Los Angeles, San Francisco and Seattle prices reflect special provisions of amendment No. 2 to OPA Price Schedule No. 49.

†† For zoned cities these grades have been revised to NE 8617-20.

‡ For zoned cities these grades have been revised to NE 9442-45 Ann'ld.

* Base delivered prices according to price zones established by Amendments to RPS 49 including the 3% transportation tax—not including the 6% freight increase of March 18, 1942, rescinded May 15, 1943.

***Recommended for large sections only. Note: The extras shown above are in addition to a base price of 2.70c. per 100 lb., on finished products and $54 per gross ton on semi-finished steel major basing points and are in cents per 100 lb. and dollars per gross ton in semi-finished. When acid open-hearth is specified and acceptable add to basic open hearth alloy differential 0.25c. per lb. for bars and bar strip, $5.00 per gross ton for billets, blooms and slabs. The ranges shown above are restricted to sizes 100 sq. in. or less or equivalent cross sectional area 18 in. wide or under with a max. individual piece weight of 7000 lb.**

## PRICES

### CAST IRON WATER PIPE

| | *Per Net Ton* |
|---|---|
| 4-in. and larger, del'd Chicago | $54.80 |
| 4-in. and larger, del'd New York | 52.20 |
| 6-in. and larger, Birmingham | 46.00 |
| 6-in. and larger f.o.b. cars, San Francisco or Los Angeles | 69.40 |
| 6-in. and larger f.o.b. cars, Seattle | 71.20 |

Class "A" and gas pipe, $3 extra; 4-in. pipe is $3 a ton above 6-in. Prices shown are for lots of less than 200 tons. For 200 tons or over, 6-in. and larger is $45 at Birmingham and $53.80 delivered Chicago, $59.40 at San Francisco and Los Angeles, and $70.20 at Seattle. Delivered prices do not reflect new 3 per cent tax on freight rates.

### LAKE SUPERIOR ORES

(51.50% *Fe, Natural Content, Delivered Lower Lake Ports**)

| | *Per Gross Ton* |
|---|---|
| Old range, bessemer, 51.50 | $4.75 |
| Old range, non-bessemer, 51.50 | 4.60 |
| Mesaba, bessemer, 51.50 | 4.60 |
| Mesaba, non-bessemer, 51.50 | 4.45 |
| High phosphorus, 51.50 | 4.35 |

*Adjustments are made to indicate prices based on variance of Fe content of ores as analyzed on a dry basis by independent laboratories.

### COKE

***Furnace***

| | *Per Net Ton* |
|---|---|
| †Connellsville, prompt | $6.50* |

***Foundry***

| | |
|---|---|
| †Connellsville, prompt | 7.50 |
| Fayette County, W. Va. (Beehive) | 8.10 |
| By-product, Chicago | 12.25 |
| By-product, New England | 13.75 |
| By-product, Newark | 12.40 to 12.95 |
| By-product, Philadelphia | 12.38 |
| By-product, Cleveland | 12.30 |
| By-product, Cincinnati | 11.75 |
| By-product, Birmingham | 8.50† |
| By-product, St. Louis | 12.02 |
| By-product, Buffalo | 12.50 |

Maximum by-product coke prices established by OPA became effective Oct. 1, 1941.

*Hand-drawn ovens using trucked coal are permitted to charge $7.00 per net ton, plus usual transportation. Maximum beehive furnace coke prices established by OPA, Feb. 8, 1942. †F.o.b. oven.

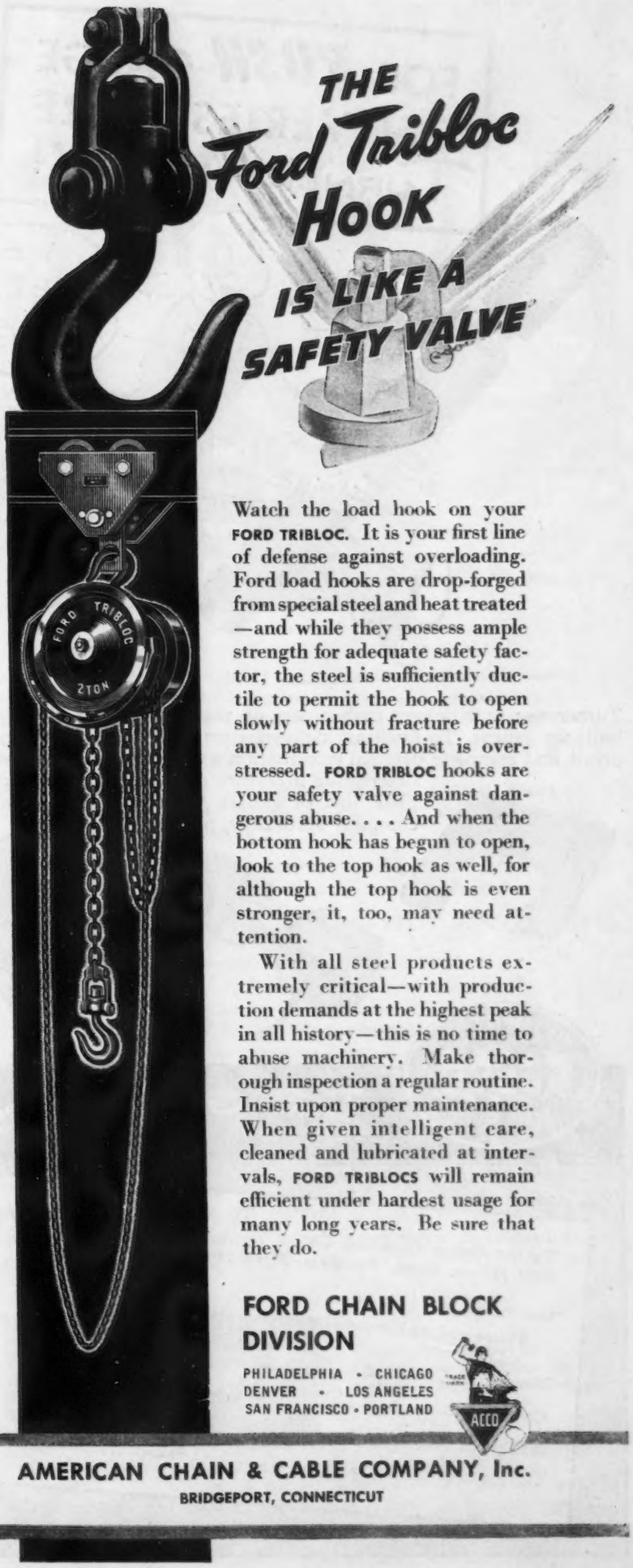
### FLUORSPAR

Pursuant to OPA Revised Maximum Price Regulation No. 126, effective July 1, 1943, to **Aug. 29, 1943**, base price per short ton is set at $33 for 70 per cent or more effective $CaF_2$ content; $32 for 65 but less than 70 per cent; $31 for 60 but less than 65 per cent; and $30 for less than 60 per cent. F.o.b. consumer's plant (1) plus either railroad freight on such shipment from the producer's shipping point to the consumer's plant, or (2) railroad freight on such a shipment from Rosiclaire, Ill., to the consumer's plant, which ever is lower. On and after Aug. 30, 1943, the maximum price f.o.b. a consumer's plant on any shipment of metallurgical grade fluorspar shall be $30 per short ton. Over $30 may be charged provided the producer receives specific instructions from the Steel Division of WPB to the effect that a specific consumer must have one of the higher grades, as provided in Section No. 4 (b).

### REFRACTORIES

(*F.o.b. Works*)

| ***Fire Clay Brick*** | *Per 1000* |
|---|---|
| Super-duty brick, St. Louis | $64.60 |
| First quality, Pa., Md., Ky., Mo., Ill. | 51.30 |
| First quality, New Jersey | 56.00 |
| Sec. quality, Pa., Md., Ky., Mo., Ill. | 46.55 |
| Second quality, New Jersey | 51.00 |
| No. 1, Ohio | 43.00 |
| Ground fire clay, net ton | 7.60 |
| ***Silica Brick*** | |
| Pennsylvania and Birmingham | $51.30 |
| Chicago District | 58.50 |
| Silica cement, net ton (Eastern) | 9.00 |
| ***Chrome Brick*** | *Per Net Ton* |
| Standard, chemically bonded, Balt., Plymouth Meeting, Chester | $54.00 |
| ***Magnesite Brick*** | |
| Standard, Balt. and Chester | $76.00 |
| Chemically bonded, Baltimore | 65.00 |
| ***Grain Magnesite*** | |
| Domestic, f.o.b. Balt. and Chester in sacks (carloads) | $44.00 |
| Domestic, f.o.b. Chewelah, Wash. (in bulk) | 22.00 |


Watch the load hook on your **FORD TRIBLOC.** It is your first line of defense against overloading. Ford load hooks are drop-forged from special steel and heat treated —and while they possess ample strength for adequate safety factor, the steel is sufficiently ductile to permit the hook to open slowly without fracture before any part of the hoist is overstressed. **FORD TRIBLOC** hooks are your safety valve against dangerous abuse. . . . And when the bottom hook has begun to open, look to the top hook as well, for although the top hook is even stronger, it, too, may need attention.

With all steel products extremely critical—with production demands at the highest peak in all history—this is no time to abuse machinery. Make thorough inspection a regular routine. Insist upon proper maintenance. When given intelligent care, cleaned and lubricated at intervals, **FORD TRIBLOCS** will remain efficient under hardest usage for many long years. Be sure that they do.

**FORD CHAIN BLOCK DIVISION**

PHILADELPHIA • CHICAGO
DENVER • LOS ANGELES
SAN FRANCISCO • PORTLAND

ACCO

**AMERICAN CHAIN & CABLE COMPANY, Inc.**
BRIDGEPORT, CONNECTICUT

Turner can now deliver rush orders on their plug, snap, flush pin and built up gauges. To facilitate deliveries we advise that you send blueprints and complete detailed information with your purchase order. For descriptive literature and prices on Turner's complete line of gauges write us today. (On your company stationery, please.)

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TURNER GAUGE GRINDING COMPANY
2629 HILTON ROAD • • • • FERNDALE, MICH.

Turner Gauge Grinding Co.
2629 Hilton Road, Ferndale, Michigan

Gentlemen:
Please send me complete information about your gauge deliveries.

Name..... Title.....
Company.....
Address..... State.....
City.....


## PRICES

### BOLTS, NUTS, RIVETS, SET SCREWS

***Bolts and Nuts***

*(F.o.b. Pittsburgh; Cleveland, Birmingham or Chicago)*

**Machine and Carriage Bolts:**

| | *Per Cent Off List* |
|---|---|
| ½ in. & smaller x 6 in. & shorter | 65½ |
| 9/16 & ⅝ in. x 6 in. & shorter | 63½ |
| ¾ to 1 in. x 6 in. & shorter | 61 |
| 1⅛ in. and larger, all length | 59 |
| All diameters over 6 in. long | 59 |
| Lag, all sizes | 62 |
| Plow bolts | 65 |

**Nuts, Cold Punched or Hot Pressed:**
*(Hexagon or Square)*

| | |
|---|---|
| ½ in. and smaller | 62 |
| 9/16 to 1 in. inclusive | 59 |
| 1⅛ to 1½ in. inclusive | 57 |
| 1⅝ in. and larger | 56 |

On above bolts and nuts, excepting plow bolts, additional allowance of 10 per cent for full container quantities. There is an additional 5 per cent allowance for carload shipments.

| Semi-Fin. Hexagon Nuts | U.S.S. | S.A.E. |
|---|---|---|
| 7/16 in. and smaller | .. | 64 |
| ½ in. and smaller | 62 | .. |
| ½ in. through 1 in. | .. | 60 |
| 9/16 to 1 in. | 59 | .. |
| 1⅛ in. through 1½ in. | 57 | 58 |
| 1⅝ in. and larger | 56 | .. |

In full container lots, 10 per cent additional discount.

***Stove Bolts***

| | |
|---|---|
| Packages, nuts loose | 71 and 10 |
| In packages, with nuts attached | 71 |
| In bulk | 80 |

On stove bolts freight allowed up to 65c. per 100 lb. based on Cleveland, Chicago, New York on lots of 200 lb. or over.

***Large Rivets*** *(½ in. and larger)*

| | *Base per 100 lb.* |
|---|---|
| F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham | $3.75 |

***Small Rivets*** *(7/16 in. and smaller)*

| | *Per Cent Off List* |
|---|---|
| F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham | 65 and 5 |

***Cap and Set Screws***

| | *Per Cent Off List* |
|---|---|
| Upset full fin. hexagon head cap screws, coarse or fine thread, up to and incl. 1 in. x 6 in. | 64 |
| Upset set screws, cup and oval points | 71 |
| Milled studs | 46 |
| Flat head cap screws, listed sizes | 36 |
| Filister head cap, listed sizes | 51 |

Freight allowed up to 65c. per 100 lb. based on Cleveland, Chicago or New York on lots of 200 lb. or over.

### RAILS, TRACK SUPPLIES

*(F.o.b. Mill)*

| | |
|---|---|
| Standard rails, heavier than 60 lb., No. 1 O.H., gross ton | $40.00 |
| Angle bars, 100 lb. | 2.70 |
| *(F.o.b. Basing Points)* | *Per Gross Ton* |
| Light rails (from billets) | $40.00 |
| Light rails (from rail steel) | 39.00 |
| | *Base per Lb.* |
| Cut spikes | 3.00c. |
| Screw spikes | 5.15c. |
| Tie plates, steel | 2.15c. |
| Tie plates, Pacific Coast | 2.30c. |
| Track bolts | 4.75c. |
| Track bolts, heat treated, to railroads | 5.00c. |
| Track bolts, jobbers discount | 63-5 |

Basing points, light rails—Pittsburgh, Chicago, Birmingham; spikes and tie plates—Pittsburgh, Chicago, Portsmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minnequa, Colo., Birmingham and Pacific Coast ports; tie plates alone—Steelton, Pa., Buffalo; spikes alone—Youngstown, Lebanon, Pa., Richmond.

### ROOFING TERNE PLATE

*(F.o.b. Pittsburgh, 112 Sheets)*

| | 20x14 in. | 20x28 in. |
|---|---|---|
| 8-lb. coating I.C. | $6.00 | $12.00 |
| 15-lb. coating I.C. | 7.00 | 14.00 |
| 20-lb. coating I.C. | 7.50 | 15.00 |

## PRICES

### ELECTRICAL SHEETS

*(Base, f.o.b. Pittsburgh)*

| | *Per Lb.* |
|---|---|
| Field grade | 3.20c. |
| Armature | 3.55c. |
| Electrical | 4.05c. |
| Motor | 4.95c. |
| Dynamo | 5.65c. |
| Transformer 72 | 6.15c. |
| Transformer 65 | 7.15c. |
| Transformer 58 | 7.65c. |
| Transformer 52 | 8.45c. |

F.o.b. Granite City, add 10c. per 100 lb. on field grade to and including dynamo. Pacific ports add 75c. per 100 lb. on all grades.

### WIRE PRODUCTS

*To the trade, f.o.b. Pittsburgh, Chicago, Cleveland, Birmingham*

| | *Base per Keg* |
|---|---|
| Standard wire nails | $2.55 |
| Coated nails | 2.55 |
| Cutnails, carloads | 3.85 |
| | *Base per 100 Lb.* |
| Annealed fence wire | $3.05 |
| Annealed galvanized fence wire | 3.40 |
| | *Base Column* |
| Woven wire fence* | 67 |
| Fence posts (carloads) | 69 |
| Single loop bale ties | 59 |
| Galvanized barbed wire† | 70 |
| Twisted barbless wire | 70 |

*15½ gage and heavier. †On 80-rod spools in carload quantities.

### WELDED PIPE AND TUBING

*Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills*

*(F.o.b. Pittsburgh only on wrought pipe)*
*Base Price—$200 per Net Ton*

***Steel (Butt Weld)***

| | *Black* | *Galv.* |
|---|---|---|
| ½ in. | 63½ | 51 |
| ¾ in. | 66½ | 55 |
| 1 to 3 in. | 68½ | 57½ |

***Wrought Iron (Butt Weld)***

| | | |
|---|---|---|
| ½ in. | 25 | 3½ |
| ¾ in. | 30 | 10 |
| 1 and 1¼ in. | 34 | 16 |
| 1½ in. | 38 | 18½ |
| 2 in. | 37½ | 18 |

***Steel (Lap Weld)***

| | | |
|---|---|---|
| 2 in. | 61 | 49½ |
| 2½ and 3 in. | 64 | 52½ |
| 3½ to 6 in. | 66 | 54½ |

***Wrought Iron (Lap Weld)***

| | | |
|---|---|---|
| 2 in. | 30½ | 12 |
| 2½ to 3½ in. | 31½ | 14½ |
| 4 in. | 33½ | 18 |
| 4½ to 8 in. | 32½ | 17 |

***Steel (Butt, extra strong, plain ends)***

| | *Black* | *Galv.* |
|---|---|---|
| ½ in. | 61½ | 50½ |
| ¾ in. | 65½ | 54½ |
| 1 to 3 in. | 67 | 57 |

***Wrought Iron (Same as Above)***

| | | |
|---|---|---|
| ½ in. | 25 | 6 |
| ¾ in. | 31 | 12 |
| 1 to 2 in. | 38 | 19½ |

***Steel (Lap, extra strong, plain ends)***

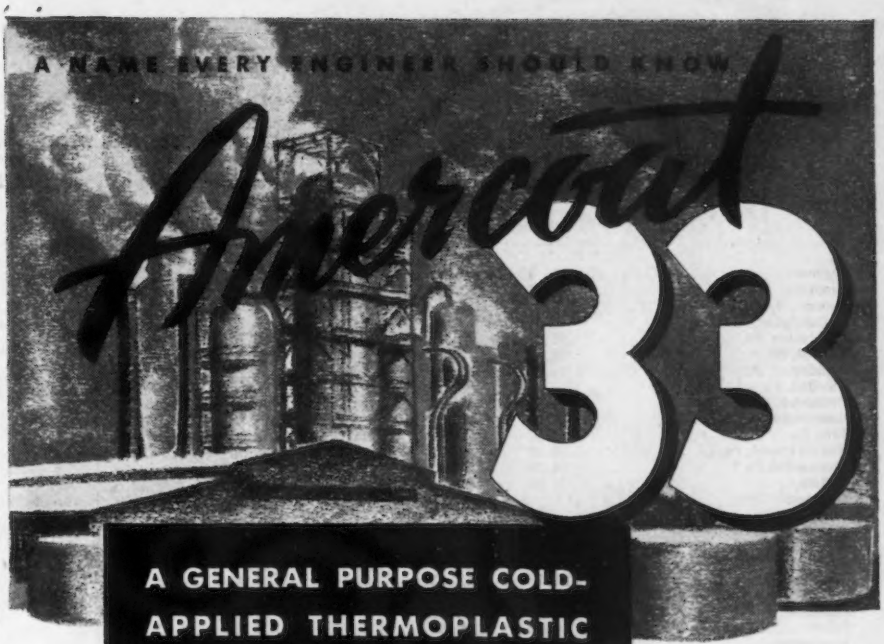
| | | |
|---|---|---|
| 2 in. | 59 | 48½ |
| 2½ and 3 in. | 63 | 52½ |
| 3½ to 6 in. | 66½ | 56 |

***Wrought Iron (Same as Above)***

| | | |
|---|---|---|
| 2 in. | 33½ | 15½ |
| 2½ to 4 in. | 39 | 22½ |
| 4½ to 6 in. | 37½ | 21 |

On butt weld and lap weld steel pipe jobbers are granted a discount of 5%. On less-than-carload shipments prices are determined by adding 25 and 30% and the carload freight rate to the base card.

F.o.b. Gary prices are two points lower discount or $4 a ton higher than Pittsburgh or Lorain on lap weld and one point lower discount, or $2 a ton higher on all butt weld.


A GENERAL PURPOSE COLD-APPLIED THERMOPLASTIC COATING FOR A WIDE RANGE OF APPLICATIONS

*Amercoat* No. 33 Thermoplastic Coating is the result of two years of careful development and exhaustive test both in the laboratory and in the field. It meets the urgent demand for an inert, easy-to-apply protective coating for wood, metal and concrete.

*Amercoat* No. 33 is used as a coating for structural steel, floors, filters, tanks, concrete walls and floors, machinery, ship bottoms and boottopping, concrete urinals, shower bases, laundry tubs... wherever buildings and equipment are exposed to corrosive fumes or the corrosive action of salt water, fresh water or various mild acids or caustics.

*Amercoat* No. 33 Thermoplastic Coating is composed of the correct combination of the most inert synthetic resins obtainable. It comes in liquid form and is easily applied with ordinary industrial paint spray equipment or by brush. It may be applied in any number of coats required for any particular condition. It is odorless, tasteless, resistant to moderate abrasion and is dielectric to a high degree.

**Amercoat No. 33 does not replace, nor is it a substitute for other Amercoat Compounds which have been developed for more highly specialized requirements.**

Amercoat DIVISION

*Write for Bulletin No. 33 which gives complete data on AMERCOAT No. 33 and the many uses for which it is suited.*

**AMERICAN PIPE & CONSTRUCTION COMPANY**
**P.O. BOX 3428, TERMINAL ANNEX • LOS ANGELES, CALIF.**
Canadian Dist: Gunite & Waterproofing, Ltd., 1538 Sherbrooke St., W., Montreal

## PIG IRON

All prices set in bold face type are maxima established by OPA on June 24, 1941. Other domestic prices (in italics) are delivered quotations per gross ton computed on the basis of the official maxima. Delivered prices do not reflect 3 per cent tax on freight rates.

| | No. 2 Foundry | Basic | Bessemer | Malleable | Low Phosphorus | Charcoal |
|---|---|---|---|---|---|---|
| Boston†† | *$25.50* | *$25.00* | *$26.50* | *$25.50* | ..... | ..... |
| Brooklyn | *27.50* | ..... | ..... | *28.00* | ..... | ..... |
| Jersey City | *26.53* | *26.03* | *27.53* | *27.03* | ..... | ..... |
| Philadelphia | *25.84* | *25.34* | *26.84* | *26.34* | *$30.74* | ..... |
| Bethlehem, Pa. | 25.00 | 24.50 | 26.00 | 25.50 | ..... | ..... |
| Everett, Mass.†† | 25.00 | 24.50 | 26.00 | 25.50 | ..... | ..... |
| Swedeland, Pa. | 25.00 | 24.50 | 26.00 | 25.50 | ..... | ..... |
| Steelton, Pa. | ..... | 24.50 | ..... | ..... | 29.50 | ..... |
| Birdsboro, Pa. | 25.00 | 24.50 | 26.00 | 25.50 | 29.50 | ..... |
| Sparrows Point, Md. | 25.00 | 24.50 | ..... | ..... | ..... | ..... |
| Erie, Pa. | 24.00 | 23.50 | 25.00 | 24.50 | ..... | ..... |
| Neville Island, Pa. | 24.00 | 23.50 | 24.50 | 24.00 | ..... | ..... |
| Sharpsville, Pa.* | 24.00 | 23.50 | 24.50 | 24.00 | ..... | ..... |
| Buffalo | 24.00 | 23.00 | 25.00 | 24.50 | 29.50 | ..... |
| Cincinnati, Ohio | *23.94* | *23.94* | ..... | *25.11* | ..... | ..... |
| Canton, Ohio | *25.39* | *24.89* | *25.89* | *25.39* | *32.69* | ..... |
| Mansfield, Ohio | *25.94* | *25.44* | *26.44* | *25.94* | *32.86* | ..... |
| St. Louis | *24.50* | *24.50* | ..... | ..... | ..... | ..... |
| Chicago | 24.00 | 23.50 | 24.50 | 24.00 | *35.46* | .....*$31.34* |
| Granite City, Ill. | 24.00 | 23.50 | 24.50 | 24.00 | ..... | ..... |
| Cleveland | 24.00 | 23.50 | 24.50 | 24.00 | *32.42* | ..... |
| Hamilton, Ohio | 24.00 | 23.50 | ..... | 24.00 | ..... | ..... |
| Toledo | 24.00 | 23.50 | 24.50 | 24.00 | ..... | ..... |
| Youngstown* | 24.00 | 23.50 | 24.50 | 24.00 | *32.42* | ..... |
| Detroit | 24.00 | 23.50 | 24.50 | 24.00 | ..... | ..... |
| Lake Superior fc. | ..... | ..... | ..... | ..... | ..... | $34.00 |
| Lyles, Tenn. fc.† | ..... | ..... | ..... | ..... | ..... | 33.00 |
| St. Paul | *26.76* | ..... | *27.26* | *26.76* | *39.80* | ..... |
| Duluth | 24.50 | 24.00 | 25.00 | 24.50 | ..... | ..... |
| Birmingham | 20.38 | 19.00 | 25.00 | ..... | ..... | ..... |
| Los Angeles | *26.95* | ..... | ..... | ..... | ..... | ..... |
| San Francisco | *26.95* | ..... | ..... | ..... | ..... | ..... |
| Seattle | *26.95* | ..... | ..... | ..... | ..... | ..... |
| Provo, Utah | 22.00 | 21.50 | ..... | ..... | ..... | ..... |
| Montreal | *27.50* | *27.50* | ..... | *28.00* | ..... | ..... |
| Toronto | *25.50* | *25.50* | ..... | *26.00* | ..... | ..... |

GRAY FORGE IRON: Valley or Pittsburgh furnace ..... $23.50

*Pittsburgh Coke & Iron Co. (Sharpsville, Pa., furnace only) and the Struthers Iron and Steel Co., Struthers, Ohio, may charge 50c. a ton in excess of basing point prices for No. 2 foundry, basic, bessemer and malleable.

**Pittsburgh Ferromanganese Co. (Chester furnace only) may charge $2.25 a ton over maximum basing point prices.

†Price shown is for low-phosphorous iron; high-phosphorous sells for $28.50 at the furnace.

††Eastern Gas & Fuel Associates, Boston, is permitted to sell pig iron produced by its selling company, Mystic Iron Works, Everett, Mass., at $2 per gross ton above maximum prices.

Delta Chemical & Iron Co., Chicago, may charge $30 for charcoal iron at its Delta, Mich., furnace.

Basing point prices are subject to switching charges; silicon differentials (not to exceed 50c. a ton for each 0.25 per cent silicon content in excess of base grade which is 1.75 per cent to 2.25 per cent); phosphorous differentials, a reduction of 38c. per ton for phosphorous content of 0.70 per cent and over; manganese differentials, a charge not to exceed 50c. per ton for each 0.50 per cent manganese content in excess of 1.00 per cent. Effective March 3, 1943, $2 per ton extra may be charged for 0.5 to 0.75 per cent nickel content and $1 per ton extra for each additional 0.25 per cent nickel.

## Metal Powders

Prices are based on current market prices of ingots plus a fixed figure. For ton lots f.o.b. shipping point, in cents per lb.

| | |
|---|---|
| Copper, electrolytic, 150 and 200 mesh | 21⅛ to 23⅛c. |
| Copper, reduced, 150 and 200 mesh | 20½ to 25½c. |
| Iron, commercial, 100 and 200 mesh | 13½ to 15c. |
| Iron, crushed, 200 mesh and finer | 4c. |
| Iron, hydrogen reduced, 300 mesh and finer | 63c. |
| Iron, electrolytic, unannealed, coarser than 300 mesh | 30 to 33c. |
| Iron; electrolytic, annealed minus 100 mesh | 42c. |
| Iron, carbonyl, 300 mesh and finer | 90c. |
| Aluminum, 100 and 200 mesh. | *23 to 27c. |
| Antimony, 100 mesh | 20.6c. |
| Cadmium, 100 mesh | $1 |
| Chromium, 150 mesh | $1.03 |
| Lead, 100, 200 & 300 mesh, | 11½ to 12½c. |
| Manganese, 150 mesh | 51c. |
| Nickel, 150 mesh | 51½c. |
| Solder powder, 100 mesh, | 8½c. plus metal |
| Tin, 100 mesh | 58¾c. |

*Freight allowed east of Mississippi.

## BOILER TUBES

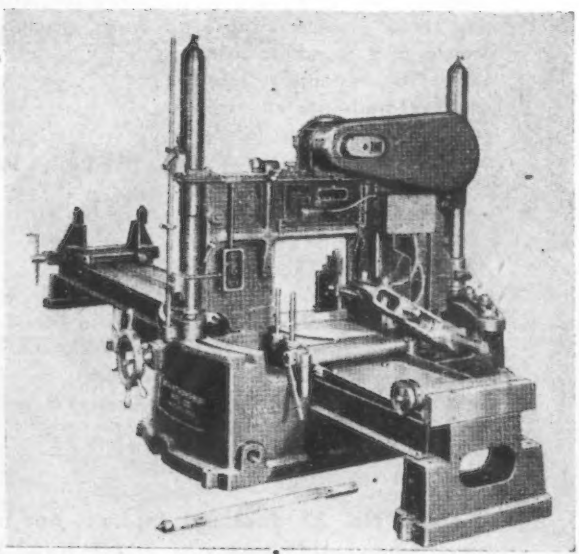
*Seamless Steel and Lap Weld Commercial Boiler Tubes and Locomotive Tubes, Minimum Wall. Net base prices per 100 ft. f.o.b. Pittsburgh, in carload lots.*

| | Seamless Cold Drawn | Hot Rolled | Lap Weld, Hot Rolled |
|---|---|---|---|
| 2 in. o.d. 13 B.W.G. | 15.03 | 13.04 | 12.38 |
| 2½ in. o.d. 12 B.W.G. | 20.21 | 17.54 | 16.58 |
| 3 in. o.d. 12 B.W.G. | 22.48 | 19.50 | 18.35 |
| 3½ in. o.d. 11 B.W.G. | 28.37 | 24.62 | 23.15 |
| 4 in. o.d. 10 B.W.G. | 35.20 | 30.54 | 28.66 |

*(Extras for less carload quantities)*

| | |
|---|---|
| 40,000 lb. or ft., and over | Base |
| 30,000 lb. or ft. to 39,999 lb. or ft. | 5% |
| 20,000 lb. or ft. to 29,999 lb. or ft. | 10% |
| 10,000 lb. or ft. to 19,999 lb. or ft. | 20% |
| 5,000 lb. or ft. to 9,999 lb. or ft. | 30% |
| 2,000 lb. or ft. to 4,999 lb. or ft. | 45% |
| Under 2,000 lb. or ft. | 65% |


**CUTS the Toughest Steels and Largest Sizes *easily.***



This giant hydraulic metal - cutting saw is more than just a larger hack saw. It is a new development in metal-cutting methods that introduces a new principle of metal sawing — the Roll-stroke blade action makes it possible to cut the toughest steels in the largest sizes easily and rapidly. It also permits a simple and efficient, very low pressure Hydraulic Feed System.

Built for heavy work, completely enclosed in heavy housing, this machine will stand up under the rough usage of the average steel mill warehouse and forge shop, where it will speed cutting-off, and reduce material loss.

**MARVEL No. 18**
***Giant Hydraulic Hack Saw***
**Capacity 18"x18"**

Cuts angles up to 45° by simply swiveling upper machine housing.

*Write for Catalog*

MARVEL SAWS

**ARMSTRONG-BLUM MFG. CO.**
*"The Hack Saw People"*
**5700 Bloomingdale Ave., Chicago, U. S. A.**

*Eastern Sales Office*
*225 Lafayette St., New York*

## PRICES

### SEMI-FINISHED STEEL

***Billets, Blooms and Slabs***

Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Sparrows Point (rerolling only). Prices delivered Detroit are $2.00 higher; f.o.b. Duluth, billets only, $2.00 higher. Delivered prices do not reflect new per cent tax on freight rates.

| | *Per Gross Ton* |
|---|---|
| Rerolling | $34.00 |
| Forging quality | 40.00 |
| Alloy steel: Pittsburgh, Chicago, Canton, Massillon, Buffalo, or Bethlehem, per gross ton | $54.00 |

***Shell Steel***

| | *Per Gross Ton* |
|---|---|
| 3 in. to 12 in. | $52.00 |
| 12 in. to 18 in. | 54.00 |
| 18 in. and over | 56.00 |

Basic open hearth shell steel, f.o.b. Pittsburgh, Chicago, Buffalo, Gary, Cleveland, Youngstown and Birmingham.

Prices delivered Detroit are $2.00 higher.

Note: The above base prices apply on lots of 1000 tons of a size and section to which are to be added extras for chemical requirements, cutting, or quantity.

***Sheet Bars***

Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point, Md.

| | *Per Gross Ton* |
|---|---|
| Open hearth or bessemer | $34.00 |

***Skelp***

Pittsburgh, Chicago, Youngstown, Coatesville, Pa., Sparrows Point, Md.

| | *Per Lb.* |
|---|---|
| Grooved, universal and sheared | 1.90c. |

***Wire Rods***

*(No. 5 to 9/32 in.)*

| | *Per Lb.* |
|---|---|
| Pittsburgh, Chicago, Cleveland | 2.00c. |
| Worcester, Mass. | 2.10c. |
| Birmingham | 2.00c. |
| San Francisco | 2.50c. |
| Galveston | 2.25c. |

9/32 in. to 47/64 in., 0.15c. a lb. higher. Quantity extras apply.

### TOOL STEEL

*(F.o.b. Pittsburgh, Bethlehem, Syracuse)*

| | *Base per lb.* |
|---|---|
| High speed | 67c. |
| Straight molybdenum | 54c. |
| Tungsten-molybdenum | 57½c. |
| High-carbon-chromium | 43c. |
| Oil hardening | 24c. |
| Special carbon | 22c. |
| Extra carbon | 18c. |
| Regular carbon | 14c. |

Warehouse prices east of Mississippi are 2c. a lb. higher; west of Mississippi 3c. higher.

### CORROSION AND HEAT-RESISTING STEEL

*(Per lb. base price, f.o.b. Pittsburgh)*

***Chromium-Nickel Alloys***

| | No. 304 | No. 302 |
|---|---|---|
| Forging billets | 21.25c. | 20.40c. |
| Bars | 25.00c. | 24.00c. |
| Plates | 29.00c. | 27.00c. |
| Structural shapes | 25.00c. | 24.00c. |
| Sheets | 36.00c. | 34.00c. |
| Hot rolled strip | 23.50c. | 21.50c. |
| Cold rolled strip | 30.00c. | 28.00c. |
| Drawn wire | 25.00c. | 24.00c. |

***Straight-Chromium Alloys***

| | No. 410 | No. 430 | No. 442 | No. 446 |
|---|---|---|---|---|
| F.Billets | 15.725c. | 16.15c. | 19.125c. | 23.375c. |
| Bars | 18.50c. | 19.00c. | 22.50c. | 27.50c. |
| Plates | 21.50c. | 22.00c. | 25.50c. | 30.50c. |
| Sheets | 26.50c. | 29.00c. | 32.50c. | 36.50c. |
| Hot strip | 17.60c. | 17.50c. | 24.00c. | 35.00c. |
| Cold strip | 22.00c. | 22.50c. | 32.00c. | 52.00c. |

***Chromium-Nickel Clad Steel (20%)***

| | No. 304 |
|---|---|
| Plates | 18.00c.* |
| Sheets | 19.00c. |

*Includes annealing and pickling.

The Welding Equipment & Supply Company offers manufacturers a complete line of Eureka Tool Steel Welding Electrodes. They consist of 6 types, namely: 2 water hardening, 2 oil hardening, 1 air hardening, 1 hot working in sizes $\frac{1}{16}$" to $\frac{3}{16}$" inclusive. These EUREKA Welding Electrodes are used for the maintenance repair of your existing tools and dies as well as for the composite construction of new units. In addition to the above line there is available, Eureka "DRAWALLOY" Welding Electrodes for maintenance repair of forging dies and the creation of bearing surfaces. Write for our catalog and procedure manual which describes this complete line of EUREKA Tool Steel Welding Electrodes.

1. 72 Hot Working Electrodes
2. 70W Oil Hardening Electrodes
3. 75X Water Hardening Electrodes
4. 1215 Air Hardening Electrodes
5. 71M Oil Hardening Electrodes
6. 8510 Water Hardening Electrodes

***DISTRIBUTORS IN PRINCIPAL CITIES IN UNITED STATES AND CANADA***

**DELIVERY**

Immediate deliveries can be made on all sizes and types of Eureka Tool Steel and "DRAWALLOY" Welding Electrodes.

WELDING EQUIPMENT & SUPPLY CO.
230 Leib Street • DETROIT, MICHIGAN

Let's all be Upp and Adam by using Eureka Tool Steel and "DRAWALLOY" Welding Electrodes to save and conserve tool steel during this critical period.

Gentlemen:

Please send me complete information and prices on your EUREKA Tool Steel and "DRAWALLOY" Welding Electrodes.

Name..... Title.....

Company.....

Address.....

City..... State.....

# JOHNSON XLO Music Wire

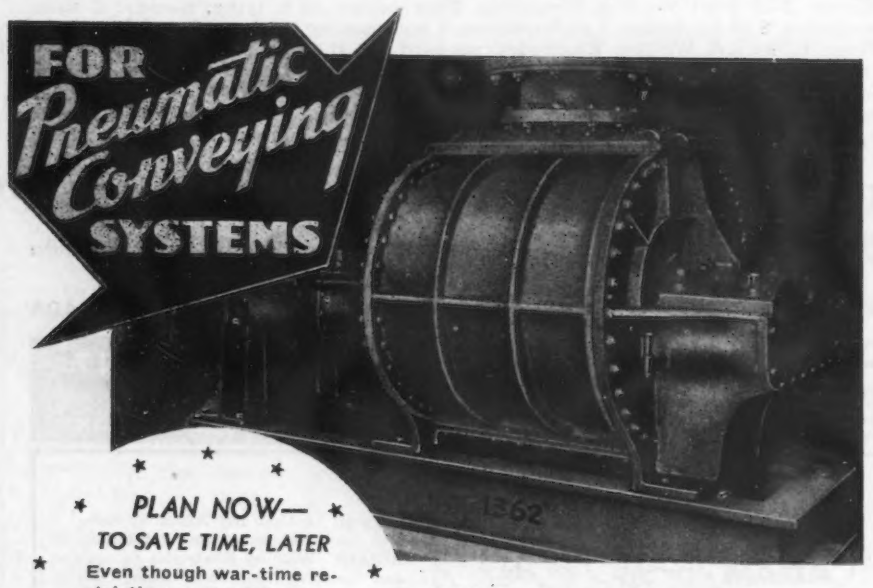
Wire of a thousand uses . . . XLO Music Wire is an exceptionally high quality product. It is drawn under constant laboratory control all the way from original steel to finished product.

XLO Music Wire meets all requirements of commercial and governmental specifications (WD 1085—WD 1095). Stock sizes .005" to .200" dia. In coils or packages.

**JOHNSON STEEL & WIRE CO., INC.**
WORCESTER 7, MASSACHUSETTS
NEW YORK ATLANTA AKRON CHICAGO LOS ANGELES



# FOR Pneumatic Conveying SYSTEMS



PLAN NOW— TO SAVE TIME, LATER

Even though war-time restrictions may defer certain improvements involving new equipment, we shall be glad to work with you now on future plans. Some helpful bulletins are available on request.

"R-C" Positive Displacement Blowers are naturally adapted for pneumatic conveying systems because of their inherent ability to build up pressures needed to keep material moving in the conveying lines. Performance records show lowest power consumption. We specialize in building blowers to meet any capacity and moderate pressure requirement, but do not furnish complete systems.

**ROOTS-CONNERSVILLE BLOWER CORP.**
309 Ohio Avenue Connersville, Indiana

Roots CONNERSVILLE SINCE 1854 — Rotary Positive BLOWERS


## PRICES

### *Ferromanganese*

78-82% manganese, maximum contract base price per gross ton, lump size, f.o.b. car at Baltimore, Philadelphia, New York, Birmingham, Rockdale, Rockwood, Tenn.

| | |
|---|---|
| Carload lots (bulk) | $135.00 |
| Ton lots (packed) | 141.00 |
| Less ton lots (packed) | 148.50 |

Premium, $1.70 for each 1% above 82% Mn; penalty, $1.70 for each 1% below 78%.

### *Electrolytic Manganese*

99.9% manganese, maximum base contract price per lb. of metal, bulk, f.o.b. shipping point, with freight allowed to destination. Size, 1" x D.

| | Eastern Zone | Central Zone | Western Zone |
|---|---|---|---|
| Carload lots | 37.60c. | 37.85c. | 38.15c. |
| l.c.l. lots | 39.60c. | 38.60c. | 40.65c. |

### *Spiegeleisen*

Maximum base contract prices, per gross ton, lump, f.o.b. Palmerton, Pa.

| | 16-19% Mn 1% max. Si | 19-21% Mn 1% max. Si | 26-28% Mn 1% max. Si |
|---|---|---|---|
| Carloads | $35.00 | $36.00 | $49.50 |
| Less ton* | 47.50 | 48.50 | 62.00 |

### *Electric Ferrosilicon*

OPA maximum base price cents per lb. contained Si, lump size in carlots, f.o.b. shipping point with freight allowed to destination.

| | Eastern Zone | Central Zone | Western Zone |
|---|---|---|---|
| 50% silicon | 6.65c. | 7.10c. | 7.25c. |
| 75% silicon | 8.05c. | 8.20c. | 8.75c. |

Spot sales 45c. per lb. higher for 50% Si; 30c. for 75% Si. For extras and premiums see MPR 405.

### *Silvery Iron*

(*Per Gross Ton, base 6.00 to 6.50 Si*)

| | |
|---|---|
| F.o.b. Jackson, Ohio | $29.50* |
| Buffalo | 30.75* |

For each additional 0.50% silicon add $1 a ton. For each 0.50% manganese over 1% add 50c. a ton. Add $1 a ton for 0.75% phosphorus or over.

*Official OPA price established June 24, 1941.

### *Bessemer Ferrosilicon*

Prices are $1 a ton above silvery iron quotations of comparable analysis.

### *Silicon Metal*

OPA maximum base price per lb. of contained Si, lump size, f.o.b. shipping point with freight allowed to destination. for l.c.l. above 2000 lb., packed.

| | Eastern Zone | Central Zone | Western Zone |
|---|---|---|---|
| 96% Si, 2% Fe. | 13.10c. | 13.55c. | 16.50c. |
| 97% Si, 1% Fe. | 13.45c. | 13.90c. | 16.80c. |

### *Ferrosilicon Briquets*

OPA maximum base price per lb. of briquet, bulk, f.o.b. shipping point with freight allowed to destination. Approximately 40% silicon.

| | Eastern Zone | Central Zone | Western Zone |
|---|---|---|---|
| Car lots | 3.35c. | 3.50c. | 3.65c. |

Spot prices ¼c. higher per lb. of briquet. For premiums and extras see MPR 405.

### *Silicomanganese*

(*Per gross ton, delivered, carloads, bulk*)

| | |
|---|---|
| 3.00 carbon | $120.00* |
| 2.50 carbon | 125.00* |
| 2.00 carbon | 130.00* |
| 1.00 carbon | 140.00* |
| Briquets, contract, basis carlots, bulk freight allowed, per lb. | 5.80c.† |
| Packed | 6.05c.† |
| Less ton lots | 6.55c.† |

*Spot prices are $5 per ton higher.
†Spot prices ¼c. higher.

### *Ferrochrome*

(65-72% *Cr*, 2% *max. Si*)

OPA maximum base contract prices per lb. of contained Cr, lump size in carlots, f.o.b. shipping point, freight allowed to destination.

| | Eastern Zone | Central Zone | Western Zone |
|---|---|---|---|
| 0.03% carbon | 25.00c. | 25.40c. | 26.00c. |
| 0.06% carbon | 23.00c. | 23.40c. | 24.00c. |
| 0.10% carbon | 22.50c. | 22.90c. | 23.50c. |
| 1.00% carbon | 20.50c. | 20.90c. | 21.50c. |
| 2.00% carbon | 19.50c. | 19.90c. | 20.50c. |

Spot prices are ¼c. higher per lb. contained Cr. For extras and premiums see MPR 407.

### *Other Ferroalloys*

| | |
|---|---|
| Ferrotungsten, delivered, carlots, per lb. contained tungsten | $1.90 |
| Tungsten metal powder, 98%-99%, any quantity, per lb. | $2.60 |
| Ferrovanadium, 35%-40%, contract basis, f.o.b. producers plant, usual freight allowances, open-hearth grade, per lb. contained vanadium | $2.70 |
| Special grade | $2.80 |
| Very special grade | $2.90 |
| Vanadium pentoxide, 88%-92% $V_2O_5$ technical grade, contract basis, any quantity, per lb. contained $V_2O_5$ | $1.10 |
| Ferroboron, contract basis, 17.50% boron minimum, f.o.b. Niagara Falls, carlots, per lb. alloy | $1.20 |
| Ton lots | $1.25 |
| Silcaz No. 3, contract basis, f.o.b. Niagara Falls, all quantities, per lb. of alloy | 23c. |
| Silvaz No. 3, contract basis, f.o.b. Niagara Falls, all quantities, per lb. of alloy | 40c. |
| Grainal, f.o.b. Bridgeville, Pa., freight allowed 100 lb. and over, maximum based on rate to St. Louis, per lb. | 45c. |
| Bortam, f.o.b. Niagara Falls Ton lots, per lb. | 45c. |
| Less ton lots, per lb. | 50c. |
| Borosil, 3% to 4% boron, 40 to 45% silicon, f.o.b. Philo, Ohio, per lb. contained boron | $7.00 |
| Ferrocolumbium, 50% to 60%, f.o.b. Niagara Falls, ton lots, per lb. contained columbium | $2.25 |
| Less ton lots | $2.30 |
| Ferrotitanium, 40%-45%, f.o.b. Niagara Falls, N. Y., ton lots, per lb. contained titanium | $1.23 |
| Less ton lots | $1.25 |
| Ferrotitanium, 20%-25%, 0.10 C max., ton lots, per lb. contained titanium | $1.35 |
| Less ton lots | $1.40 |
| High-carbon ferrotitanium, 15%-20%, 6%-8% carbon, contract basis, f.o.b. Niagara Falls, N. Y., freight allowed East of Mississippi River, North of Baltimore and St. Louis, per gross ton | $142.50 |
| 3%-5% carbon | $157.50 |
| Ferrophosphorus, 18% electric or blast furnace, f.o.b. Anniston, Ala., carlots, with $3 unitage freight equaled with Rockdale, Tenn., per gross ton | $58.50 |
| Ferrophosphorus, electrolytic 23-26%, carlots, f.o.b. Monsanto (Siglo), Tenn., $3 unitage freight equalized with Nashville, per gross ton | $75.00 |
| Ferromolybdenum, 55-75 per cent, f.o.b. Langeloth and Washington, Pa., any quantity, per lb. contained molybdenum | 95c. |
| Calcium molybdate, 40%-45%, contract basis, f.o.b. Langeloth and Washington, Pa., any quantity, per lb. contained molybdenum | 80c. |
| Molybdenum oxide briquettes, 48%-52% Mo, f.o.b. Langeloth, Pa., per lb. contained Mo | 80c. |
| Molybdenum oxide, in cans, f.o.b. Langeloth and Washington, Pa., per lb. contained Mo | 80c. |
| Molybdenum powder, 99%, in 200-lb. kegs, f.o.b. York, Pa., per lb. | $2.60 |
| Under 100 lb. | $3.00 |
| Zirconium, 35-40%, contract basis, carloads in bulk or package, per lb. of alloy | 15c. |
| Less ton lots | 16c. |
| Zirconium, 12-15%, contract basis, carlots, bulk, per gross ton | $102.50 |
| Packed | $107.50 |
| Less ton lots | $112.50 |
| Alsifer (approx. 20% Al, 40% Si and 40% Fe), contract basis, f.o.b. Niagara Falls, per lb. | 7.50c. |
| Ton lots | 8c. |
| Simanal (approx. 20% Si, 20% Mn, 20% Al), contract basis, carlots, f.o.b. Phila., Ohio, per lb. ton lots | 9.50c. |
| Less ton lots | 10.50c. |


"DOWN TO THE SEA"

GO VICTORY SHIPS *speeded by*
EUCLID CRANES

**BUILDING that "Bridge of Ships to Berlin" to hasten the prompt, unconditional surrender of the Axis is America's biggest job today! Cooperating to the fullest extent in this nation-wide effort, are the shipyards of the Lancaster Iron Works at Perryville, Maryland.**

**It is here that a 60 ft. EUCLID CRANE operates continuously, occasionally 12 hours per day, lifting heavy boat sections . . . speeding Victory Ships "Down to the Sea."**

**In War as in Peace, EUCLID CRANES AND HOISTS play a major role in production speedups because of their inherent ability to render long, trouble-free service with minimum attention and upkeep cost.**

**WE are in position to make**

**60 to 90 Days DELIVERY on 5 and 10 Ton CRANES**

**That EUCLID CRANES AND HOISTS measure up to the exacting demands of increased wartime production is evident from the roster of prominent industrialists who rely upon them constantly. That they will continue to "deliver the goods" long after the Peace is Won is evident, too!**

**EUCLID CRANE *and* HOIST CO.**
**1361 CHARDON RD. • • EUCLID, OHIO**

# PRODUCTION GOALS UP?

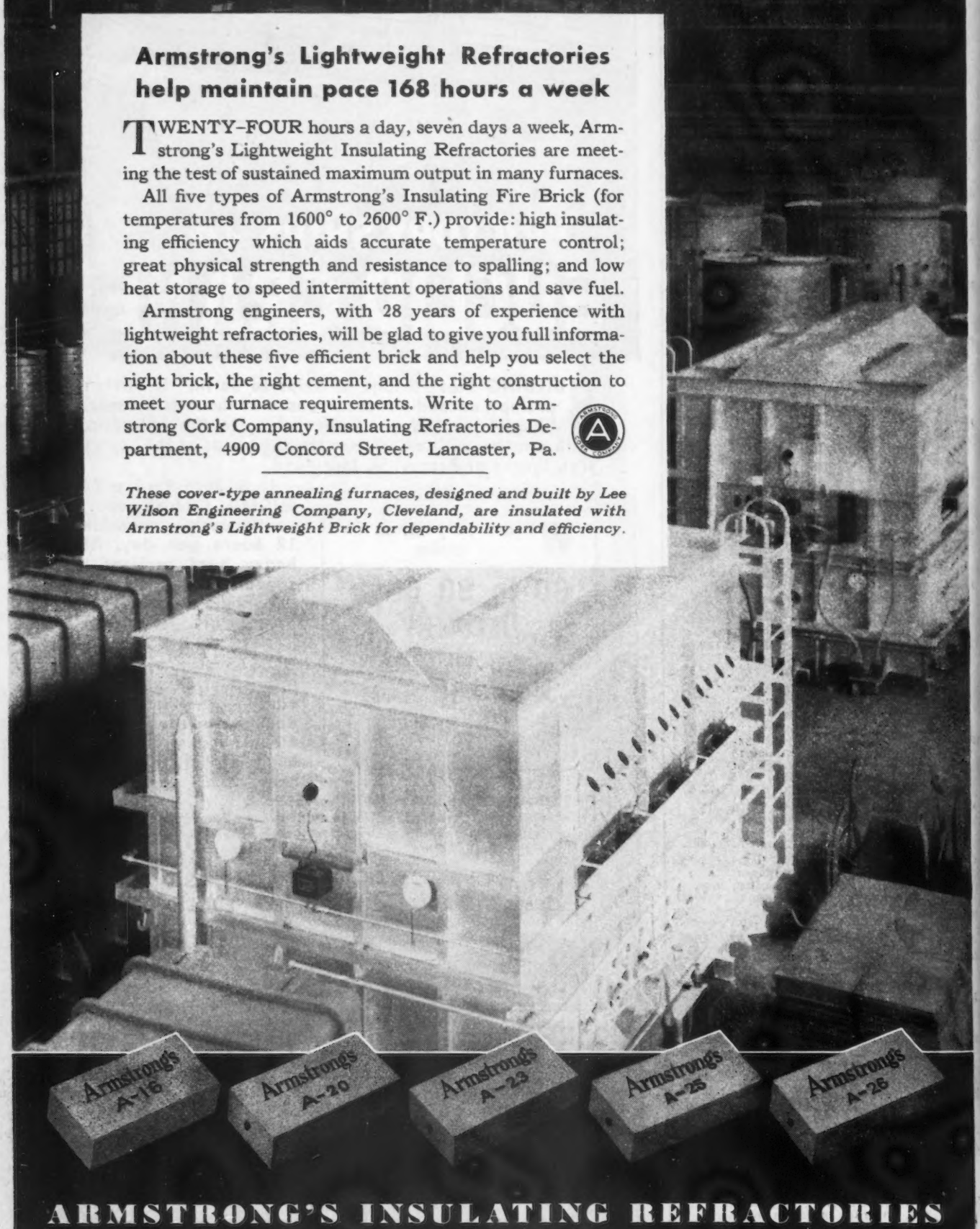
## Armstrong's Lightweight Refractories help maintain pace 168 hours a week

TWENTY-FOUR hours a day, seven days a week, Armstrong's Lightweight Insulating Refractories are meeting the test of sustained maximum output in many furnaces.

All five types of Armstrong's Insulating Fire Brick (for temperatures from 1600° to 2600° F.) provide: high insulating efficiency which aids accurate temperature control; great physical strength and resistance to spalling; and low heat storage to speed intermittent operations and save fuel.

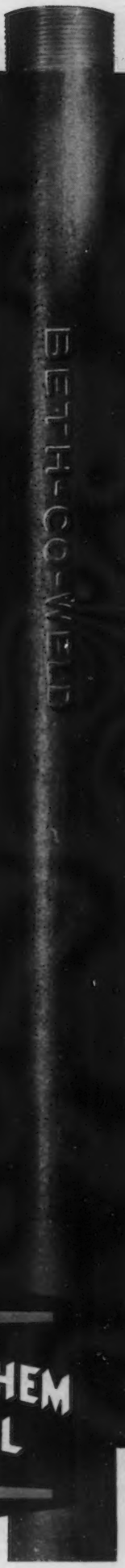
Armstrong engineers, with 28 years of experience with lightweight refractories, will be glad to give you full information about these five efficient brick and help you select the right brick, the right cement, and the right construction to meet your furnace requirements. Write to Armstrong Cork Company, Insulating Refractories Department, 4909 Concord Street, Lancaster, Pa.

*These cover-type annealing furnaces, designed and built by Lee Wilson Engineering Company, Cleveland, are insulated with Armstrong's Lightweight Brick for dependability and efficiency.*




**ARMSTRONG'S INSULATING REFRACTORIES**

# BETHLEHEM PIPE is helping war plants meet production quotas



BETHLEHEM STEEL

# It Can Happen to *anyone*

Not many months ago, we were PROUD of the fact that in spite of the pressure of demand we "Had Not Let Our Friends Down." We said so in just those words in a number of industrial publications.

Since then the unprecedented requirements for "Perfect" Oil Seals for war equipment have caught up with us. We hate to admit it, but we know we have not been able to take care of our friends as we normally do and this, in spite of all the expansion we could contrive. We are working 100 per cent on War Work.

We ask your indulgence and we promise to work out of this tight spot in deliveries just as soon as possible.

"PERFECT" Oil Seals
PATENTED

**CHICAGO RAWHIDE MANUFACTURING CO.**
1306 ELSTON AVENUE • CHICAGO, ILLINOIS

PHILADELPHIA • CLEVELAND • NEW YORK • DETROIT • BOSTON
PITTSBURGH • CINCINNATI

*65 Years Manufacturing Quality Mechanical Leather Goods*
*Exclusively and now Sirvene Synthetic Products*

***Important Announcement:***

# WARNER & SWASEY Reopens Rebuilding Department

We now have capacity to again provide owners of Warner & Swasey Turret Lathes with complete rebuilding service. On all factory rebuilt machines we use the same skilled workmen, methods, and processes that are used in the manufacture of new turret lathes.

*We guarantee that any Warner & Swasey Turret Lathe rebuilt by us will have its original accuracy and productivity.*

The nearest Warner & Swasey office can give you full information — prices, time requirements, procedure, etc.

**THE WARNER & SWASEY COMPANY**
5701 Carnegie Ave., Cleveland 3, Ohio

BOSTON, 42
238 Main St.

BUFFALO, 2
Iroquois Bldg.

CHICAGO, 6
618 W. Washington Blvd.

DAYTON, 2
436 Mutual Home Bldg.

DETROIT, 2
1308 Maccabees Bldg.

HOUSTON, 3
409 Velasco St.

LOS ANGELES, 21
1118 Santa Fe Ave.

MILWAUKEE, 2
818 Wells Bldg.

NEWARK, 2
15 Washington St.

PHILADELPHIA,
6910 Market St.

PITTSBURGH, 13
505 Medical Arts Bldg.

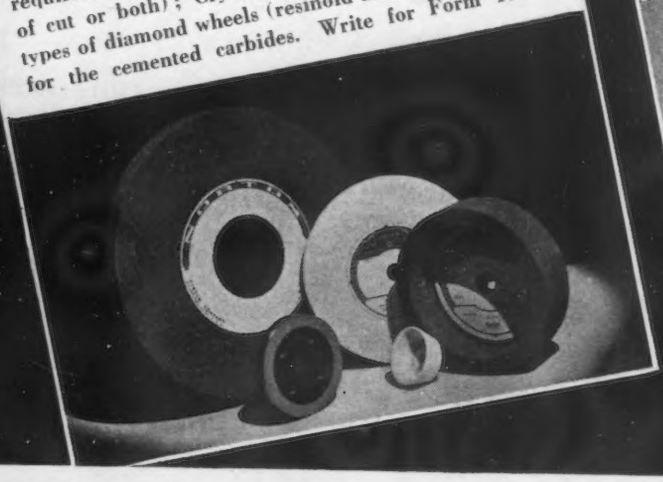
SYRACUSE, 2
517 Erie Blvd., East

YOU CAN TURN IT BETTER, FASTER, FOR WARNER & SWASEY Turret Lathes Cleveland LESS . . . WITH A WARNER & SWASEY

# NORTON ABRASIVES

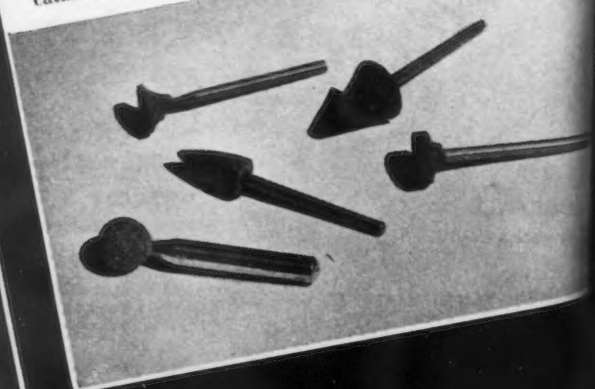
## Tool Grinding

TOOL sharpening is an important operation in every airframe plant. Norton has a complete line of wheels—Alundum and 38 Alundum abrasive, BE bond wheels for high speed steels and the cast alloys (including the Norton Open Structure Wheel for jobs requiring extra heavy stock removal or extra coolness of cut or both); Crystolon vitrified wheels and two types of diamond wheels (resinoid and metal bonded) for the cemented carbides. Write for Form 1793I.



## Burring

BURRING is an important finishing operation on thousands of aircraft parts—both in the airframe plants and the motor plants. And many of these burring operations are being done with Norton Mounted Points and Mounted Wheels. They are available in nearly 200 standard sizes and shapes. Made of Alundum or Crystolon abrasive, with vitrified, resinoid or rubber bond, they are securely cemented on rust-resistant steel spindles. Complete catalog (Form 43I) on request.

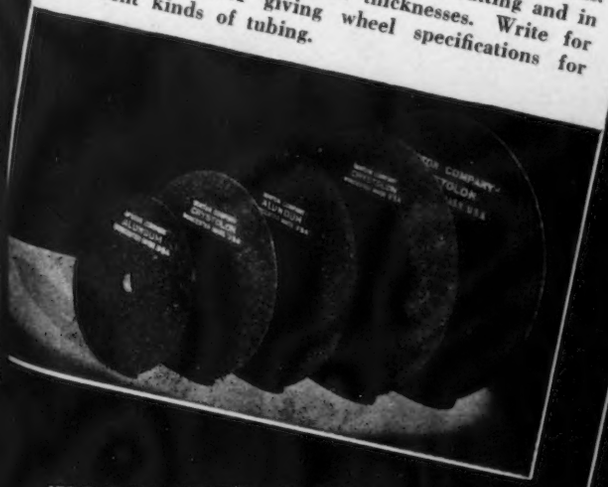


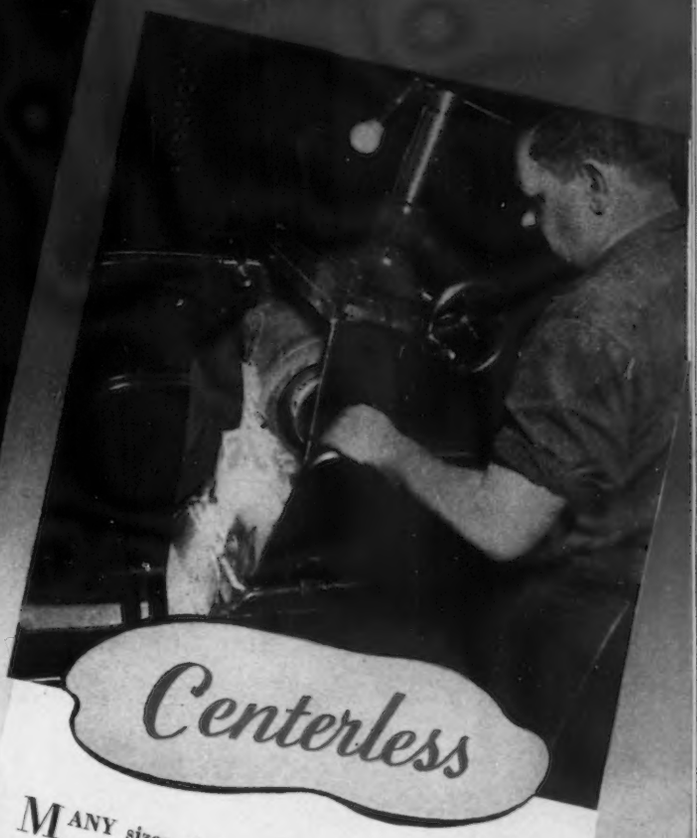
NORTON COMPANY

# . . . in the Plane Plant

## Cutting Off

THE cutting of tubing is a major operation in the airframe plants. In some of the larger planes hundreds of feet of it are used. Norton Cut-off Wheels are available in both Alundum and Crystolon abrasives (the latter especially effective for cutting aluminum) and in resinoid, rubber and shellac bonds. They are made for both wet and dry cutting and in a variety of diameters and thicknesses. Write for booklet No. 5171 giving wheel specifications for different kinds of tubing.

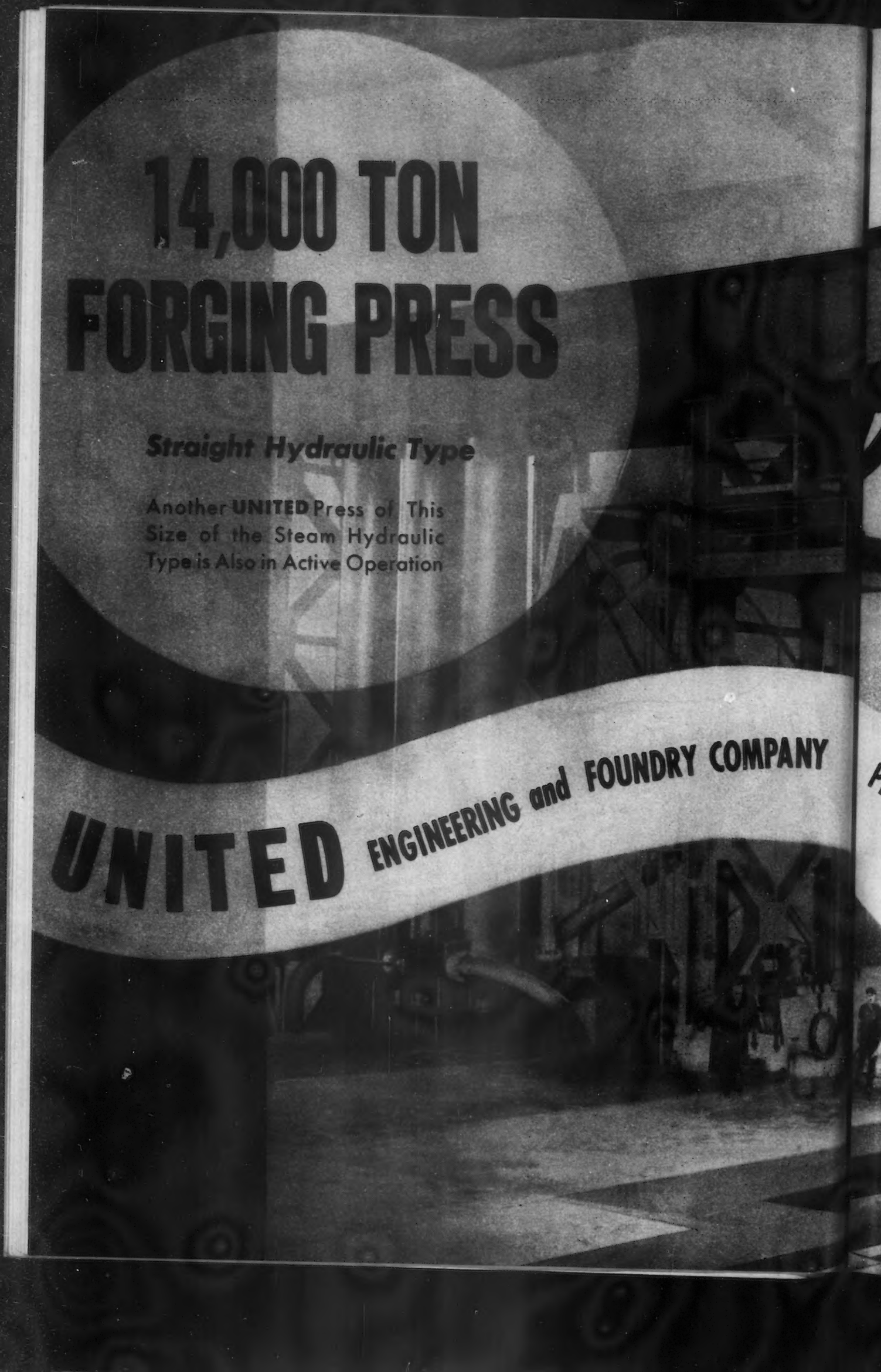




## Centerless

MANY sizes of studs and bolts as well as a large variety of other parts, both large and small are O. D. ground by the centerless method in the plane plants. Norton wheels are available of Alundum abrasive for grinding steel and of Crystolon abrasive for grinding the non-ferrous metals. And there are Norton regulating or feed wheels in the right specifications for each job. Form 2006I on O. D. grinding will be sent on request. It gives information on cylindrical grinding, too.

WORCESTER, MASS.


14,000 TON
FORGING PRESS
Straight Hydraulic Type
Another UNITED Press of This
Size of the Steam Hydraulic
Type is Also in Active Operation
UNITED ENGINEERING and FOUNDRY COMPANY

UNITED
UNITED
PITTSBURGH,
PA.

# The Arteries of Production

## CONVEYORS SPEED THE FLOW OF WAR MATERIEL!

● LOGISTICS . . . a military word . . . has its counterpart in Industry — it's CONVEYING. Getting materials, parts, assemblies and finished products from "here to there" in exactly the right time, conserving power, multiplying production and aiding the worker, are the fundamentals of mass production.

Now, with a war to win, America is fortunate to have this technique so highly developed, with specialized types of conveyors to meet the widely diversified needs and conditions of industry.

Link-Belt Company has enjoyed an important part in this development, and Link-Belt Conveyors and power transmitting machinery of every type are aiding countless war plants today to turn out more and still more urgently needed supplies for every phase of our war effort.

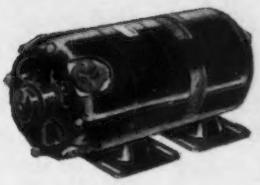
Link-Belt mass-production engineers are ready to confer with you on any conveying or power transmitting problem.

**LINK-BELT COMPANY**

Chicago—9 Indianapolis—6 Philadelphia—40 Dallas—1 Pittsburgh—19
Cleveland—13 Detroit—4 Atlanta San Francisco—24 Toronto—8
Offices, warehouses and distributors in all principal cities 9184-C

# LINK-BELT CONVEYORS

**1. TINY BUT VITAL,** this G-E gear-motor for aircraft service weighs only 8 ounces. It provides driving force for protective devices and small controls. Rating: 3 watts, intermittent, at approximately 100 rpm.



**2. DEADLINESS** of our land, sea, and air weapons has been increased—by application of the G-E amplidyne. Along the industrial front this versatile new generator-type amplifier is speeding production.

**3. EFFICIENT COOLING** of this totally enclosed d-c motor is accomplished by an air-to-air surface cooler built on the machine. High output from small frame size is the result.

# THIS G-E SERVICE IS MOBILIZED TO HELP YOU

IF THE war machines you build must be equipped with electric motors or generators, G.E. may be able to help you boost your output or motorize your designs in a better way. The important point is to get in touch with us *right at the start* of your planning.

Already, by close teamwork with builders of combat equipment, we have helped to engineer and build scores of ingenious fighting motors—many too secret to show here. Thus, a great fund of G-E experience is "on tap."

Facilities for further work on fighting motors are now available—not for every type, but possibly for the kind of motor that's right for your job. In any event, we'll give your problem prompt, realistic consideration, telling you frankly just how far and how fast we can serve you.

G-E engineers are helping apply all kinds of fighting motors to all kinds of war equipment. Your local G-E representative will help you take advantage of this service. *General Electric Company, Schenectady, New York.*

GENERAL ELECTRIC

FIGHTING MOTORS

**MORE STEEL FOR AMERICA'S FLYING FORTRESSES—**

# A Result of Alliance Cranes

For every step of steel production, from charging the open hearth to shipping the finished products, there's an Alliance long-life crane. Alliance Charging Machines exemplify the high quality found in all Alliance equipment. They stimulate higher production, thus producing more steel for flying fortresses and hundreds of other important implements of war.

Designed and built to do rough and tough jobs, Alliance Charging Machines operate smoothly. The terrific and destructive shocks, often accepted as necessary evils, are absorbed mechanically. Hence, the equipment not only lasts longer without maintenance, but there is also far less strain on the operator. When pushing cars, the side thrust is easily absorbed by expertly designed girder construction. The locking lever remains stationary as the peel is raised and lowered in charging. Furthermore, as the peel enters the charging boxes, heavy springs absorb the extreme shock which would otherwise be transmitted to the equipment and operator. But, the most appreciated feature of all is the patented shock absorbing device at the rear end of the machine. The rear wheels are mounted on slow re-coiling Edgewater springs which resist the severe up and down shock at the rear of the equipment as the charger is loading or unloading, or leveling the charge. Thus, the frequent time out periods, due to operator fatigue caused by repeated vertical shocks, are tremendously reduced. More steel production and lower maintenance costs result. And, it's this type of designing and building that makes all Alliance equipment extremely practical for rough, tough material handling jobs.

★ **Alliance** ★

**LADLE CRANES, GANTRY CRANES, FORGING MANIPULATORS, SOAKING PIT CRANES, STRIPPER CRANES, SLAB AND BILLET CHARGING MACHINES, OPEN HEARTH CHARGING MACHINES**

ARMY E NAVY

*An Alliance Charging Machine in one of America's large steel plants.*

**THE ALLIANCE MACHINE CO.**
ALLIANCE . . . . . OHIO

# HERE'S NEW Double-Trouble for V-Belt Wear!

**1**

## BUY THE BEST BELTS:

You'll get the "jump" on maintenance with Texrope Super-7's design-against-wear construction! 20% *more* pulling cords. 50% *greater strength* in every one because they're made by the special Flexon process. That adds up to extra pulling power, less stretch. A cool-running rubber cushion fights flexing heat. Tough Duplex-Sealed cover seals belt against grit, grime, and moisture. When you *do* need new belts *invest in the best* — Texrope Super 7!

**2**

## USE THE BEST CARE:

Over 75,000 men in industry are getting a head start on longer V-Belt life because they've got Allis-Chalmers' new handbook: "Plain Facts on Wartime Care of Rubber V-Belts." It gives you the inside story on "how V-belt anatomy affects maintenance"... "good-rule-of-thumb for tension"... a lot of other tips. Excellent for training new men, it's packed with valuable data. For your *free* copy, tear off the coupon and send today.

# ALLIS-CHALMERS

## TEXROPE* SUPER-7 V-BELTS

WE WORK FOR VICTORY — WE PLAN FOR PEACE

Trade mark registered U. S. Patent Office. Texrope Super-7 V-Belts are the result of the cooperative research and design genius of two great companies—Allis-Chalmers and B. F. Goodrich—and are sold exclusively by Allis-Chalmers. Available in all sizes

ALLIS-CHALMERS MFG. CO.
Milwaukee, Wisconsin

Gentlemen:

Yes, I would like to receive free of charge a copy of your "Plain Facts on Wartime Care of V-Belts".

(Name) _____

(Title) _____

(Company) _____

(Street Address) _____

(City and State) _____ A 1628-2

# Cloak of invisibility

Wire netting, covered with appropriate camouflage material, can make a big gun look like a harmless patch of brambles to the searching eyes of enemy observers.

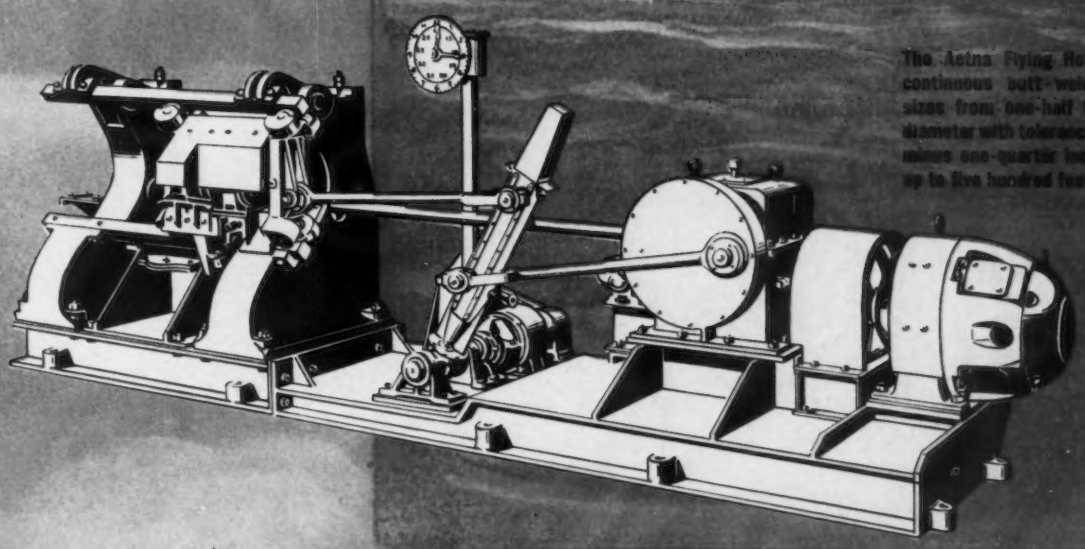
Now that airplanes have become such a devastating assault weapon, extensive and skillful use of camouflage is vital to the safety and success of any army in the field.

Bethlehem Steel Company is supplying steel wire in large quantity to processors who turn it into camouflage netting. Camouflage material now in service made from Bethlehem wire would cover a good many acres. This is one of countless ways in which Bethlehem wire mills are serving in the war effort. If you find it difficult to obtain Bethlehem wire we hope you will remember that a very large proportion of our output has been assigned to duty in the fighting areas and essential uses on the home front.

BETHLEHEM STEEL

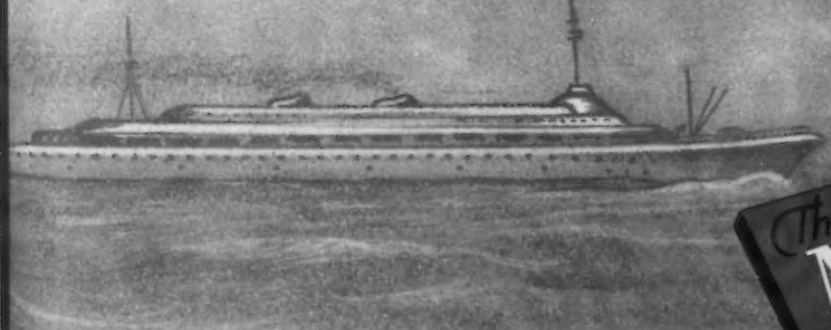
AETNA LOOKS TO FUTURE HORIZONS

# THE AETNA *Flying* HOT SAW



The Aetna Flying Hot Saw cuts continuous butt-welded pipe in sizes from one-half to four inch diameter with tolerances of plus or minus one-quarter inch at speeds up to five hundred feet per minute.

American escort ships today are winning the Battle of the Atlantic and our submarines and ships are playing an important role in the war of attrition against Japan. Welded tubing, which the above machine handles so efficiently, is a vital part of all these warships. Tomorrow it will be an equally vital part of the super liners and merchantmen, flying the American Flag, which will carry passengers and cargo to all parts of the world.

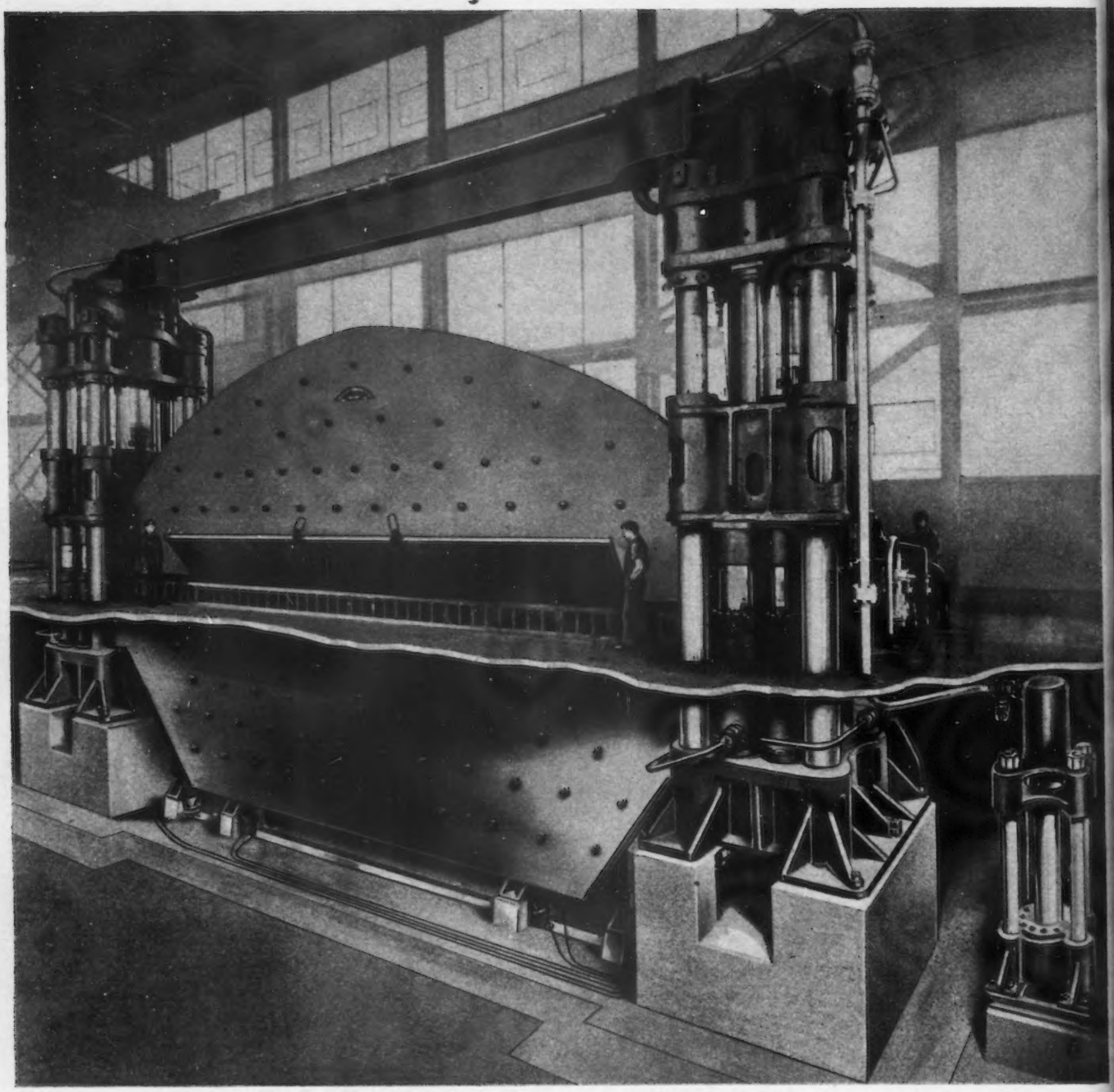


The AETNA-STANDARD ENGINEERING COMPANY
YOUNGSTOWN · OHIO · U.S.A.

ARMY E NAVY

DESIGNERS AND BUILDERS TO THE STEEL, NON-FERROUS AND CHEMICAL INDUSTRIES

*ASSOCIATED COMPANIES:*
HEAD, WRIGHTSON & COMPANY, LIMITED, THORNABY-ON-TEES, ENGLAND
JOHN INGLIS COMPANY, LIMITED, TORONTO, ONTARIO, CANADA



# SIX THOUSAND TONS

This Southwark press is probably the largest of its type in the World—a Six Thousand-ton Bending press—built by Southwark craftsmen to specifications calling for unusual design and construction. The performance of this press has met the full expectation of the owner in every respect.

Difficult assignments are not new to Southwark and are accepted with mature appreciation of all the requirements needed to achieve desired results. In addition, Southwark is manned and equipped to support this capacity.

If you have, or anticipate, a problem in your shops involving press equipment of ordinary or radical design and specification, call in our Southwark specialists.

Baldwin Southwark Division, The Baldwin Locomotive Works, Philadelphia; Pacific Coast Representative, The Pelton Water Wheel Co., San Francisco.

BLW THE BALDWIN GROUP

**BALDWIN SOUTHWARK**

*Division* **THE BALDWIN LOCOMOTIVE WORKS,** *Philadelphia, Pa.*

# ...back from danger

Safe on the carrier's deck, the Wildcat returns from a mission of danger! The giant Wasp engine in its nose has roared it to Victory—and brought it back, safe.

The engineering problems represented by these 18 powerful cylinders are staggering. Take the matter of reduction gears alone. Stepping down the high speed of the whirling crankshaft to the necessary slower propeller revolutions requires gears of such light weight and such extreme precision that only a slight variation would quickly spell their destruction. And yet, the flow of engines coming off production lines to power the world's mightiest air armada demands that these gears be produced by the hundreds of thousands.

And making these gears is Foote Bros.' job—a job that only a few months ago was considered well nigh impossible. How new production techniques—new engineering developments—resulted in the present production that keeps three plants of Foote Bros. Gear and Machine Corporation busy cannot be revealed until the war is won. But when "V" Day comes, these manufacturing know-hows can be applied to the making of precision gears for any product where close tolerances can aid in securing better performance and greater economy.

FOOTE BROS. GEAR AND MACHINE CORPORATION • 5225 S. Western Boulevard, Chicago, Illinois

The Grumman Wildcat pictured here has been the Navy's first line fighter since Pearl Harbor. O'Hare, Thatch, Gaylord and other Navy Aces became famous in the cockpit of this tough plane.

FOOTE BROS.

*Better Power Transmission Through Better Engineering*

One of our service men, Joe Baltus, was born in Vaals, Limburg, Holland, in 1905, and remembers wearing wooden shoes and seeing the tulips, and doing all the things that little Dutch boys did before the Germans came. He sailed boats, played in the sand and helped paint the windmills before coming to America while not yet twenty.

Joe couldn't speak a word of English when he landed, but he quickly learned the language and in 1929 was able to obtain a job painting castings.

He studied at night and carefully gathered knowledge of Cincinnati Planers, Vertical Boring Mills, and Planer Type Milling Machines. He told the superintendent that he thought he could be more useful as a machine operator. After operating several machine tools, he became an assembler, and later worked on the erection floor.

Joe did his work so well that now he is sent out to install Hypro machines in all parts of the U. S. A. This is the best country in the world and nobody is any more proud of the American Flag than our Joe.

Joe was happily married in 1929 and has three children. He is a proud owner of a large farm and is happy to live in a country which provides more freedom and opportunities.

We tell this story of Joe to let you know the kind of men whose lives go into the production of Cincinnati Hypro Machine Tools. He is one of the many working faithfully to rid this world of ugly wars. Cincinnati Hypro Planers, Vertical Boring Mills, and Planer Type Milling Machines are as fine as the men who build them.

**THE CINCINNATI PLANER COMPANY**
**Planers...Vertical Boring Mills...Planer Type Millers**
**CINCINNATI . OHIO . U.S.A.**

*This girl is making one of the 480 tests and inspections used to make sure that* G-E Mazda *lamps stay brighter longer.*

# WARTIME LIGHTING SUGGESTION

YEAR after year, General Electric lamp research has pushed up the efficiency of G-E lamps. Why not get all the benefit of G-E research?

Dust and dirt on lamps and fixtures, plus dark walls and ceilings, can waste as much as half the light you pay for . . . reducing your lighting to the level produced by the lamps of 20 or 30 years ago . . . wasting much of the added light G-E research has given you.

Clean your lighting equipment regularly. Wash walls and ceilings, and if you repaint, use light colors. General Electric Company, Nela Park, Cleveland, Ohio.

*Hear the General Electric Radio programs: The "Hour of Charm", Sunday, 10 p. m. EWT, NBC; "The World Today" news every weekday, 6:45 p. m. EWT, CBS.*

**G-E MAZDA LAMPS**

**GENERAL ELECTRIC**

★ THE BEST INVESTMENT IN THE WORLD IS IN THIS COUNTRY'S FUTURE — BUY WAR BONDS ★

# CO COMES TO CARBIDE!

## A NEW SERVICE TO FIRTHITE USERS

Firth-Sterling announces **"COLOR-BRANDING"** —a new way of marking FIRTHITE Sintered-Carbide Tips and Tools so that the user can determine the grade of carbide at a glance . . . clearly . . . unmistakably.

Eight different "colors" now appear on FIRTHITE unmounted Tips: red, white, blue, green, yellow, brown, black, purple.

These unmounted Tips reach the user already color-branded on the outer end. After brazing, the user simply paints on the tool shank the color that appeared on the **Tip** before it was brazed.

The handy FIRTHITE **Color Chart** is available to users on request. This chart is mounted for hanging on the wall. It is a quick-reference guide to the selection of FIRTHITE Sintered-Carbide Tips and Tools.

*Firth-Sterling Steel Company*

OFFICES: McKEESPORT, PA.-NEW YORK-HARTFORD-PHILADELPHIA-CLEVELAND-DAYTON-DETROIT-CHICAGO-LOS ANGELES

# 8 Firthite Grades NOW "Color Branded" FOR

## QUICK, EASY, SURE IDENTIFICATION

(For fuller descriptions of these grades, see pages 10 and 11 of Firthite Users' Handbook—or consult a Firthite Engineer.)

**HA** — **The peak-production carbide** for finishing hard, abrasive irons, non-ferrous and non-metallic materials. Used for turning, facing, sawing, boring, and reaming.

**TA** — **The general-purpose carbide** for cutting all types of steel in high-speed production. TA machines both ferrous and non-ferrous materials, such as aluminum.

**T-04** — **The heavy-duty carbide** for coarse feeds, heavy and interrupted roughing cuts. Closest approach to a universal grade. Machines armor plate, softer steels, cast iron, etc.

**T-89** — **The special-purpose carbide** for rough turning shells, etc. Withstands shock and jump cuts. T-89 is resistant to corrosion, erosion, heat, wear, and chip cratering.

**T-16** — **The super-speed carbide** for light, rapid finishing of harder steels, shells, etc. T-16 is especially suited for "Hyper-Milling" of heat-treated alloy steels.

**T-31** — **The precision-work carbide** for lightest, fastest, shallow cuts on hard, alloy, and treated steels. Hardest, most wear-resistant grade for precision boring, etc.

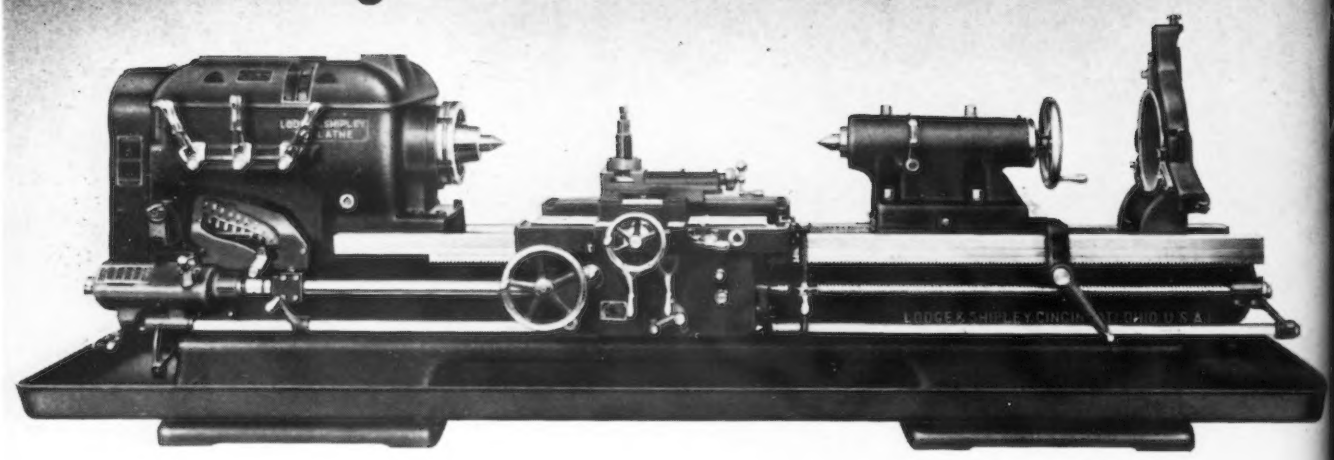
**HC** — **The carbide for hogging cuts** on soft materials at slow speeds. Excellent for skiving brass and grooving aluminum-alloy pistons. Withstands impact, vibration, abuse.

**H** — **The average-conditions carbide.** Most dependable grade for general use in roughing softer metals and less abrasive non-metallic materials at moderate speeds.

## Firth-Sterling Steel Company

OFFICES: McKEESPORT, PA.-NEW YORK-HARTFORD-PHILADELPHIA-CLEVELAND-DAYTON-DETROIT-CHICAGO-LOS ANGELES

# TOMORROW'S LATHE ... TODAY!



INCORPORATING every feature necessary for easy and profitable operation, the Lodge & Shipley 25" and 27" Selective Head Lathes are powerful, heavy duty machines which reflect in every detail the experience gained over many years of specialized manufacture of lathes. Whether the job be one requiring unusually close limits of accuracy or one where speedy removal of metal is necessary by heavy hogging cuts, these lathes provide an ease of operation which permits the operator to do far more and better work with less expenditure of effort.

*Write for detailed information.*

**THE LODGE & SHIPLEY MACHINE TOOL CO.**

**CINCINNATI, OHIO, U.S.A.**

ENGINE TOOL ROOM AUTOMATIC OIL COUNTRY LATHES

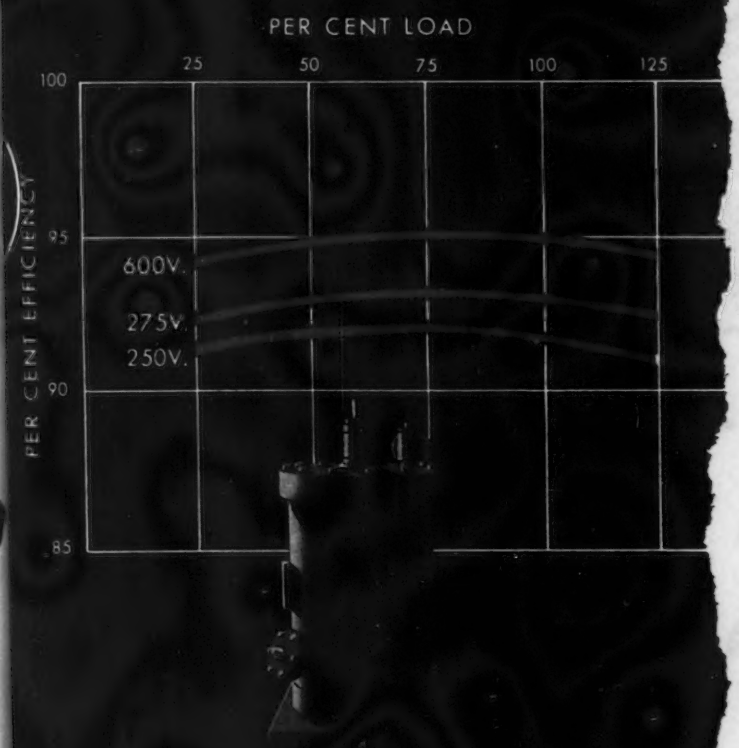
uniformly

high

# efficiency

## for Power Conversion

### peak loads... light loads... 24-hour loads




This chart shows that the Ignitron Rectifier maintains its high efficiency over the entire load range . . . a fact which offers decided advantages in many applications.

For highly fluctuating loads, Ignitron Rectifiers offer decided advantages in power conversion. Here's why:

*1. The Ignitron can operate at full capacity 24 hours a day, maintaining uniformly high efficiency.*

*2. It can handle high load swings easily, making it adaptable to widely diversified service conditions.*

*3. Efficiency at light loads is considerably higher than by other conversion methods, contributing to economy of operation.*

Ignitron operating costs are low. Simplified control, low arc drop loss, the elimination of high starting demand and absence of major moving parts hold both operating and maintenance costs to a minimum.

Installation is easy, too. No special foundations are required. An Ignitron can be installed on any level floor of reasonable strength.

Investigate the advantages of the Ignitron for your particular d-c power requirements. Your nearest Westinghouse office can give you full information. Westinghouse Electric & Mfg. Co., E. Pittsburgh, Pa.

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## In the steel industry

**The inherent advantages of the Ignitron Rectifier make it ideally suited for steel mill service. Outstanding features are high, short-time overload capacity and uniformly high efficiency throughout the load range. Also, since there are no major moving parts to be affected by dirt and grit, the Ignitron requires less maintenance.**

**For further information about the Ignitron Rectifier, write Dept. 7-N for your copy of Book B-3024.**

---

J-10252-1

Westinghouse *Electronics at Work*

**IGNITRON RECTIFIERS**

PLANTS IN 25 CITIES
OFFICES EVERYWHERE

The welded rings shown here are manufactured by the American Welding and Manufacturing Company, Warren, Ohio, from sections and bars of N-A-X Alloy Steel, produced by Great Lakes Steel Corporation.

This application is one of hundreds today in which the unusual properties of N-A-X 9100 Series Alloy Steel are being utilized in the production of ordnance equipment, where standards are high and specifications exacting.

If you have need for a High Tensile steel—or a carburizing steel—or a medium and deep hardening steel—it will pay you to investigate the properties of N-A-X 9100 Series of Alloy Steels.

DUCTILITY
IT'S INHERENTLY FINER GRAIN MAKES ALL THE DIFFERENCE
STRENGTH

Send for your copy of a new booklet describing these steels. It's yours for the asking.

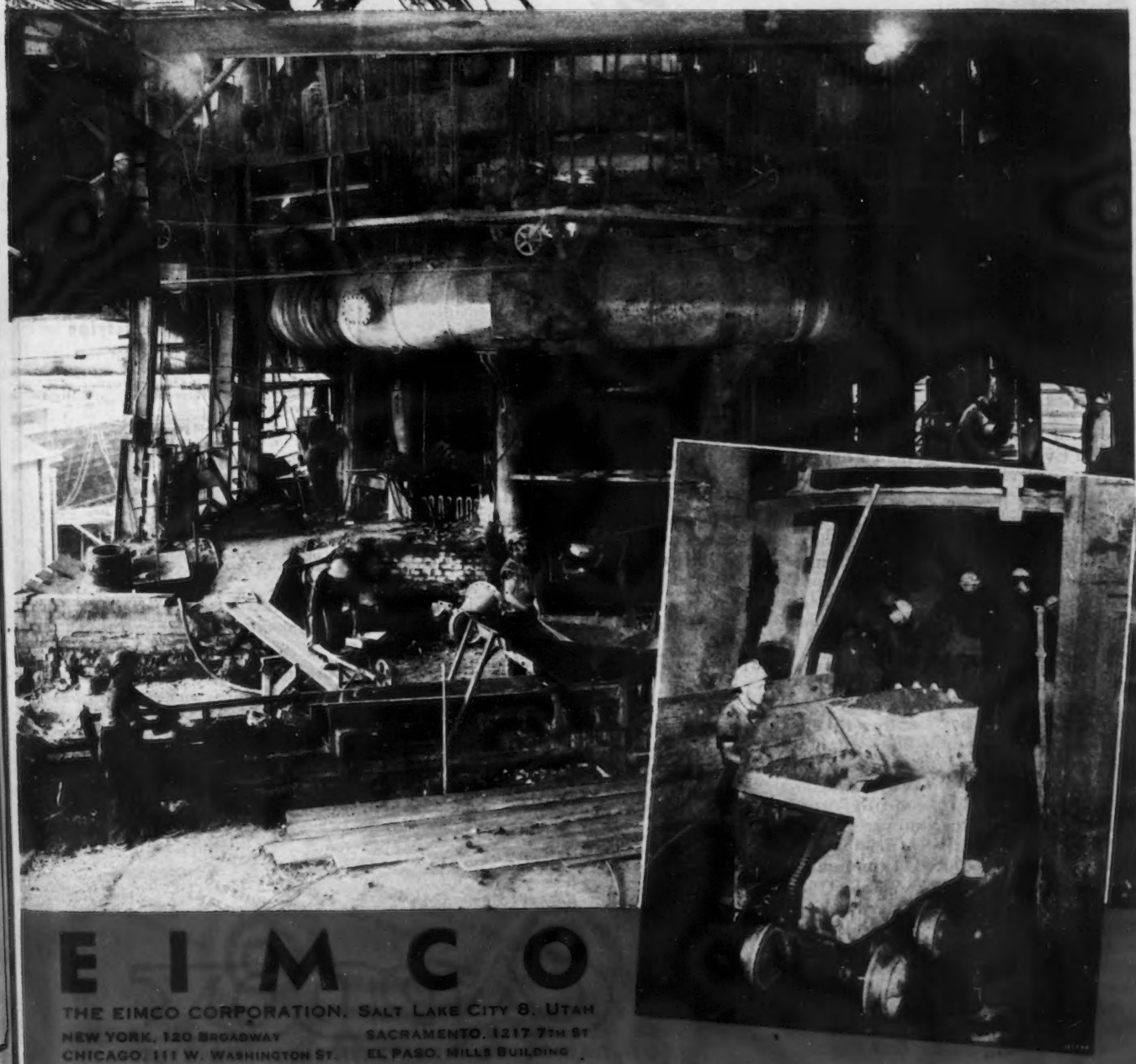
**GREAT LAKES STEEL CORPORATION**
**Detroit, Michigan**
*Sales Offices in Principal Cities*

NATIONAL STEEL CORPORATION

*Division of*
**NATIONAL STEEL CORPORATION**
*Executive Offices · Pittsburgh, Pa.*

# Speed Repairs on Blast Furnace

One large steel plant cut repair time in two on its open hearth furnaces. Twelve thousand cubic feet of brick and debris were removed from slag pockets with their Model 21 Eimco Loader in record time. Clean-up jumped from 9 cubic foot per man hour to 21 cubic foot. And now the Eimco Loader is put to work on a Blast Furnace reline in the same plant to insure speedy removal of brick, slag, and debris. You too will want to know all about the labor and time saving advantages made possible by the Eimco Loader. Our engineers are available for consultation or full information will be forwarded upon request.



**EIMCO**

THE EIMCO CORPORATION, SALT LAKE CITY 8, UTAH
NEW YORK, 120 BROADWAY — SACRAMENTO, 1217 7TH ST
CHICAGO, 111 W. WASHINGTON ST. — EL PASO, MILLS BUILDING

# This FIRE PROTECTION

## by CARDOX Fire Extinguishing Systems

More war goods from fewer man-hours is one of America's most urgent needs today! Every hour saved here is another step toward victory.

One major fire—or a small fire that results in crippling damage by the extinguishing medium—can cut the flow of vital war goods to a trickle over night. Such fires may halt or slow down production on a dozen essential fighting tools . . . waste precious man-hours and critical materials.

Cardox Fire Extinguishing Systems provide distinctive advantages in protecting production against these war-prolonging fires. They smother the fire and "cool out" combustibles through timed mass discharges of *pounds* or *tons* of $CO_2$ . . . with no damage by the extinguishing medium. Consequently, when fire strikes, men and machines are usually back in production quickly. Losses of vital materials are reduced to a minimum.

Industries guarding War-Winning Production with engineered Cardox Fire Extinguishing Systems include leading manufacturers of *Airplanes, Airplane Parts, Armor Plate, Aviation Carburetors, Aviation Engines, Cold Strip Steel, Electric Power, Engine Parts, Forgings, Motor Fuel Plastics, Processed Fabric, Rubber Products, Solvents, Tanks, Tank Engines.*

Today, the facilities of Cardox are concentrated on two activities: (1) Providing fire protection for War-Winning Production; (2) Applying the technological knowledge gained here to help industrial, municipal, state and national fire fighting organizations perfect plans to increase the efficiency of fire protection both today and after the war.

If more information would help—in solving your fire protection problems of today or tomorrow—write on your company letterhead for Bulletin 7103.

★ ★ ★

**CARDOX CORPORATION**
**BELL BUILDING • CHICAGO 1, ILLINOIS**

*District Offices in* New York • Washington
Detroit • Cleveland • Atlanta • Pittsburgh
San Francisco • Los Angeles • Seattle

### How Cardox Systems Protect War Industries

- Timed discharges, as needed, through built-in piping systems . . . supplied instantly from a single storage unit holding tons (if required) of liquid Cardox $CO_2$.
- Mass discharge of Cardox $CO_2$ "knocks out" fire, by . . .
- Reducing oxygen content of the atmosphere below the concentration necessary for combustion, and . . .
- Cooling combustibles and fire zone below ignition temperature . . .
- Extinguishing fire quickly and completely *without* damage from extinguishing medium.

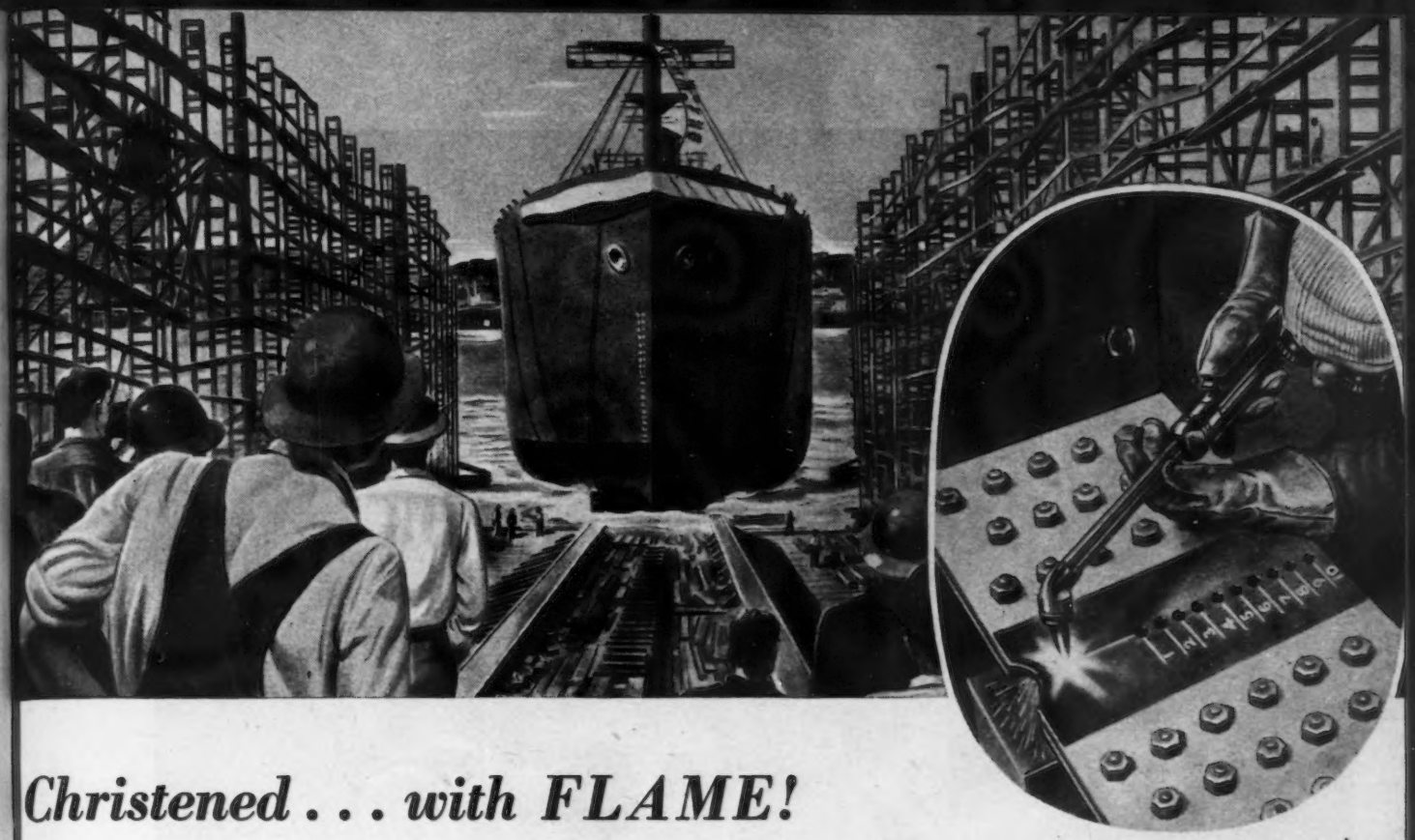
**CARDOX—$CO_2$ Systems with Enhanced Fire Extinguishing Performance**

A. Uniformity of $CO_2$ characteristics.
B. Extinguishing medium with uniformly greater cooling effect.
C. Accurate projection of $CO_2$ through greater distances.
D. Timed discharges, as needed, through built-in piping systems . . . supplied quickly from a single tank holding tons of liquid Cardox $CO_2$.

ENHANCED COOLING EFFECT
CENTRAL STORAGE UNIT
AMPLE $CO_2$ RESERVE
ENGINEERED SYSTEMS
AUTOMATIC

**CARDOX**

**NON-DAMAGING FIRE EXTINGUISHING SYSTEMS**



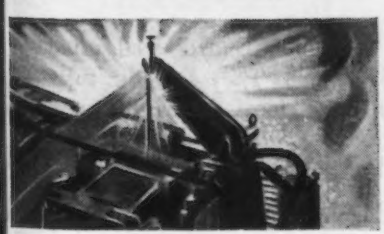
# *Christened . . . with FLAME!*

FLAME . . . as well as champagne christens ships. The last act that frees a ship from the ways is the cutting of steel bonds by oxy-acetylene flame. This swift cutting of steel typifies the way the oxy-acetylene flame is speeding the fabrication of ships, aircraft, locomotives, guns, shells, tanks, and hundreds of other vital articles made of metal.

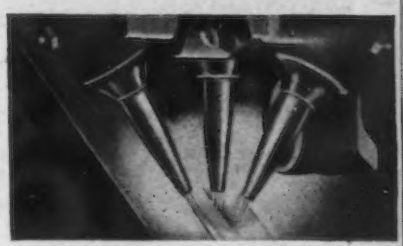
All over America, this flame cuts time and gives to mass-production industries a means of manufacturing faster, better, and at lower cost. Since the white-hot oxy-acetylene flame cuts through metal as easily as a saw through wood, it makes steelworking as simple as carpentry! From the time steel is made . . . until it is finally cut up for scrap and sent back to the steel mills for a new lease on life . . . oxy-acetylene flames expedite its treating, cutting, and fabricating.

The oxy-acetylene flame is not new. Oxygen, acetylene, and many machines and techniques for treating, cutting, and fabricating metals have been made available to industry for years by THE LINDE AIR PRODUCTS COMPANY, a Unit of UCC. The present wide application of Linde's peacetime research and development . . . coupled with the great expansion of Linde's oxygen-producing and engineering facilities *before* the emergency arose . . . are contributing vitally to this country's mass output of the things it needs. These products and processes—plus new ones that are stemming from today's continuing research — are important among the mass-production tools that can be used in the future to bring you better cars, trucks, tractors, washing machines, refrigerators, and many other things for better living at lower cost.

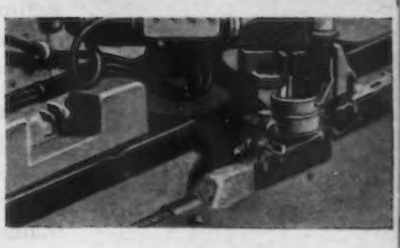
**LIQUID OXYGEN!** The demand for oxygen today is great. Driox liquid oxygen has made it possible for mass-production industries to be supplied in bulk. Liquid oxygen—occupying only 1/862 of the volume of gaseous oxygen—is shipped in tank cars and tank trucks and converted to gaseous oxygen as needed.



**SPEEDING QUALITY STEELS!** Production line efficiency in removing surface blemishes from new steel became possible with the Lin-de-Surfacer scarfing machine. Huge mechanized batteries of oxy-acetylene flames "skin" hot steel . . . quickly and economically . . . resulting in higher yields of quality steel.



**KNIVES THAT NEVER DULL!** Oxy-acetylene flames held in mechanical arms trim and bevel steel plates for welding in a fraction of the time required by methods formerly used . . . cut in straight lines, circles, or in irregular patterns. The flames are also used to harden and soften metals and to prime them for painting.



**MECHANIZED WELDING!** "Unionmelt" electric welding automatically joins steel plates as much as 20 times faster than any similarly applicable method . . . and does it without noise, fuss, or sparks. This process complements the hand and mechanized methods of welding with the oxy-acetylene flame.

*BUY UNITED STATES WAR BONDS AND STAMPS*

## UNION CARBIDE AND CARBON CORPORATION

30 East 42nd Street UCC New York 17, N. Y.

***Principal Products and Units in the United States***

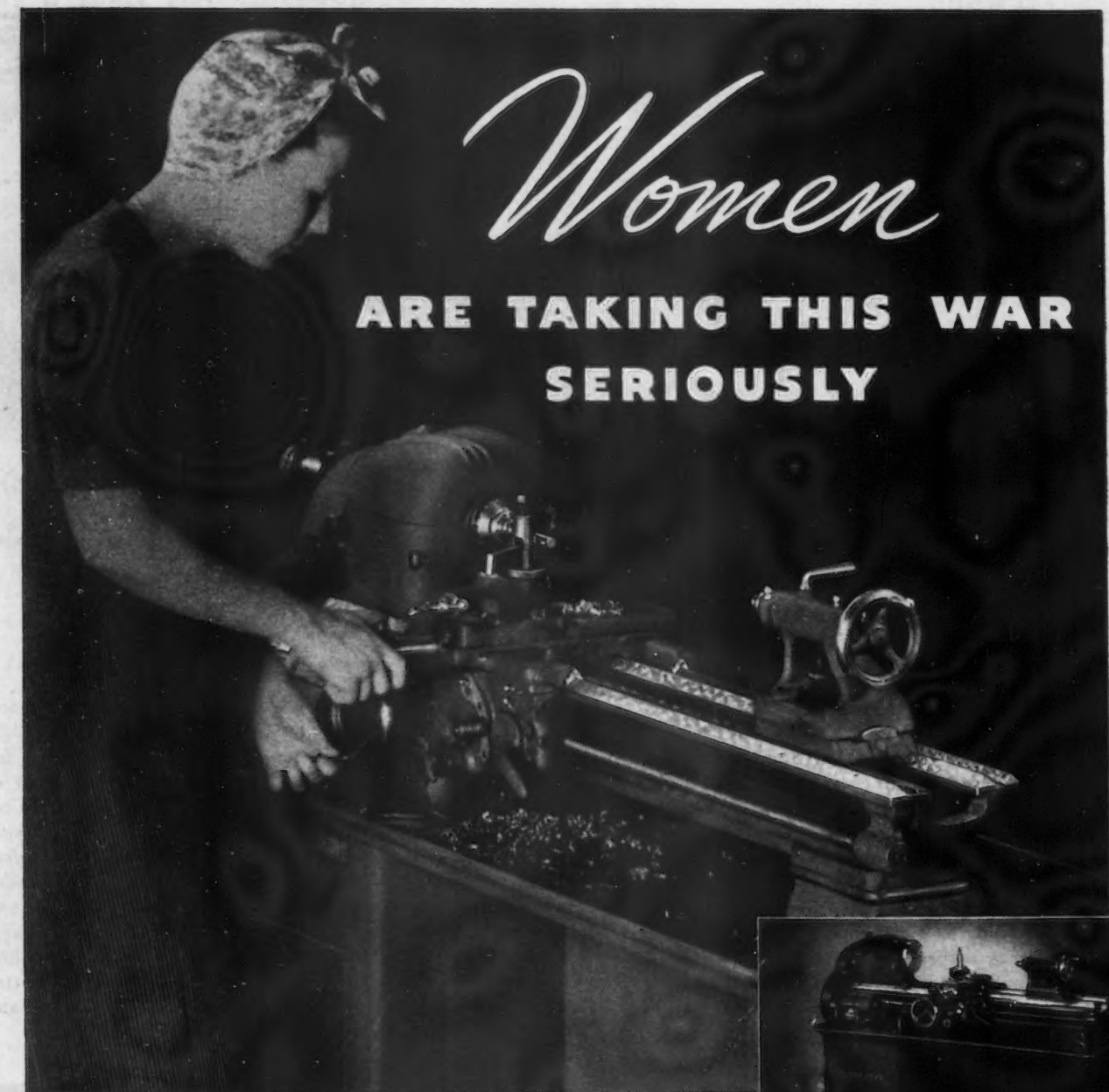
**ALLOYS AND METALS**
Electro Metallurgical Company
Haynes Stellite Company
United States Vanadium Corporation

**CHEMICALS**
Carbide and Carbon Chemicals Corporation

**ELECTRODES, CARBONS AND BATTERIES**
National Carbon Company, Inc.

**INDUSTRIAL GASES AND CARBIDE**
The Linde Air Products Company
The Oxweld Railroad Service Company
The Prest-O-Lite Company, Inc.

**PLASTICS**
Bakelite Corporation
Plastics Division of Carbide and Carbon Chemicals Corporation




# SOUTH BEND LATHES

9" swing, South Bend Engine Lathe

With grim determination thousands of American women are doing their best to fill men's shoes. Eagerly they bend their shoulders to wartime tasks—for no sacrifice is too great if it hastens the return of their men from the fighting fronts.

In hundreds of vital war plants, women are operating South Bend Lathes with surprising results. On all kinds of jobs, they have kept up production and maintained established standards of precision. In some factories whole batteries of South Bend Lathes are humming under the guidance of feminine hands.

Since World War I, women operators have preferred South Bend Lathes. Their nimble fingers find the convenient controls well suited to their sensitive touch. They like the fully enclosed design. And, most of all, they appreciate the ease of operation that prevents fatigue and makes the workday seem shorter.

South Bend Engine Lathes and Toolroom Lathes are made in five sizes: 9″ to 16″ swings, with 3′ to 12′ bed lengths. The Turret Lathes are made with 9″ and 10″ swings. Write for Catalog 100C which describes all sizes and types of South Bend Lathes.

**BUY WAR BONDS**

**SOUTH BEND LATHE WORKS**

Lathe Builders for 36 Years
SOUTH BEND, INDIANA

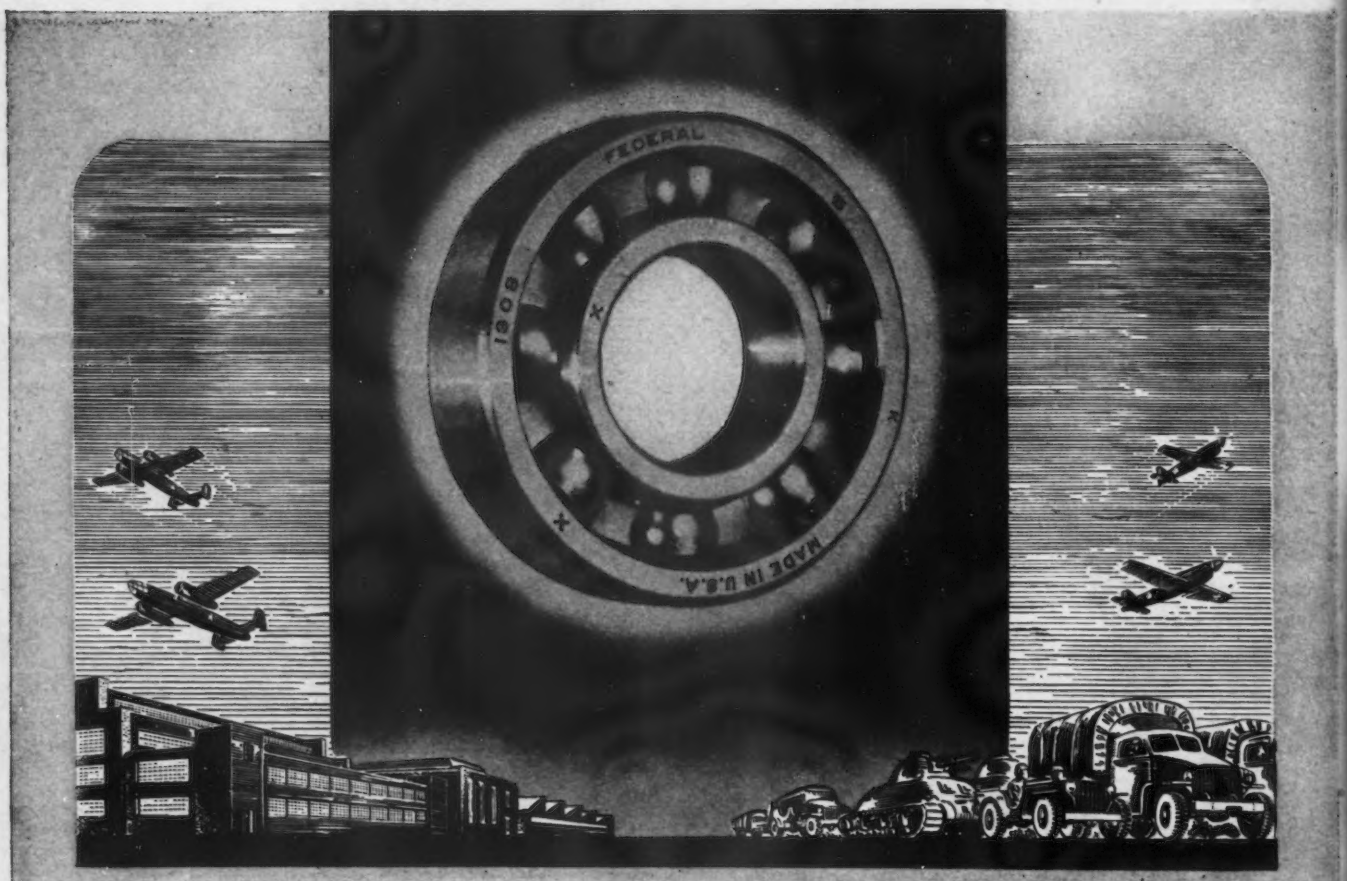
**Most of steel's uses are still undiscovered. On thousands of drafting boards there are tentative scratches, ideas in embryo, to be developed out of man's limitless imagination. New forms, unaccustomed stresses, exacting alloys—these make the challenge which Midvale welcomes. Creative steelmaking is a progressive art.**

Navy "E" with four stars

# MIDVALE

*Custom Steel-Makers to Industry*

*PHILADELPHIA • New York • Chicago • Pittsburgh • Washington • Cleveland • San Francisco*




# FEDERAL BEARINGS

TRADE MARK

Federal Bearings are doing an outstanding job—in war production, industry and in Uncle Sam's mechanized vehicles at home and abroad . . .

●

*For the duration, we are unable to supply many types of bearings formerly manufactured.*

●

THE FEDERAL BEARINGS CO., INC.

*Makers of Fine Ball Bearings*

U. S. A.

REPRESENTATIVES LOCATED AT

Detroit: 2640 Book Tower • Cleveland: 402 Swetland Building

Chicago: 902 S. Wabash Ave. • Los Angeles: 5410 Wilshire Blvd.

# SEE THAT VIBRATION?

Of course, you'd never see it! No human eye could detect a microscopic movement of only .000025". But the stroboglow lamp and the electronic tube can *see* and *feel* these vibrations.

With Dynetric Balancing Machines, the faintest impulse caused by unbalanced forces is caught at each revolution, enabling the operator to *locate* and *measure* the unbalance and then make accurate correction for it.

Today, Dynetric Balancing is used on all sizes of rotating parts from 1 ounce to 50 tons to help America build better fighting equipment.

**DYNETRIC BALANCING MACHINES** speed up work in this department where hundreds of armatures of various sizes are balanced every day. Numerals which revolve with the work piece clearly locate the point of unbalance. Literature is yours for the asking.

**GISHOLT MACHINE COMPANY**
1215 *East Washington Avenue • Madison, Wisconsin*

*Look Ahead . . . Keep Ahead . . . With Gisholt Improvements*

TURRET LATHES • AUTOMATIC LATHES

GISHOLT

BALANCING MACHINES

# A DEVASTATING "BLOCK BUSTER"

## OR JUST A TWO-TON DUD?

SPRINGS make the difference. When one of these packaged earthquakes is released on a high level raid, the springs in the bomb-arming mechanism *must* function properly—even at temperatures of 60 below. Otherwise, the bomb's terrific potential for destruction and all the cost, risks and planning involved in placing it on the target have gone to waste.

Our spring engineers have done their vital part in seeing that "Block Busters" make more than a hole in the pavement. These bombs are made "ready for business" by springs especially designed to operate regardless of extremes of temperature, weather and atmosphere.

The same high standard of spring engineering is behind the reliable performance of the tank guns, torpedoes, aircraft cannon, anti-aircraft guns and other fighting equipment for which we have designed and supplied springs by the millions.

If you need springs to meet the tough requirements of ordnance application, our spring specialists will be glad to assist you. You'll find their intimate knowledge, not only of springs but of wartime steels now available, very helpful in solving your spring problems economically and promptly.

**AMERICAN STEEL & WIRE COMPANY**

*Cleveland, Chicago and New York*

Columbia Steel Company, San Francisco, *Pacific Coast Distributors*
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UNITED STATES STEEL

# The SUPER SERVICE RADIAL is acclaimed for

## NAVAL CONSTRUCTION

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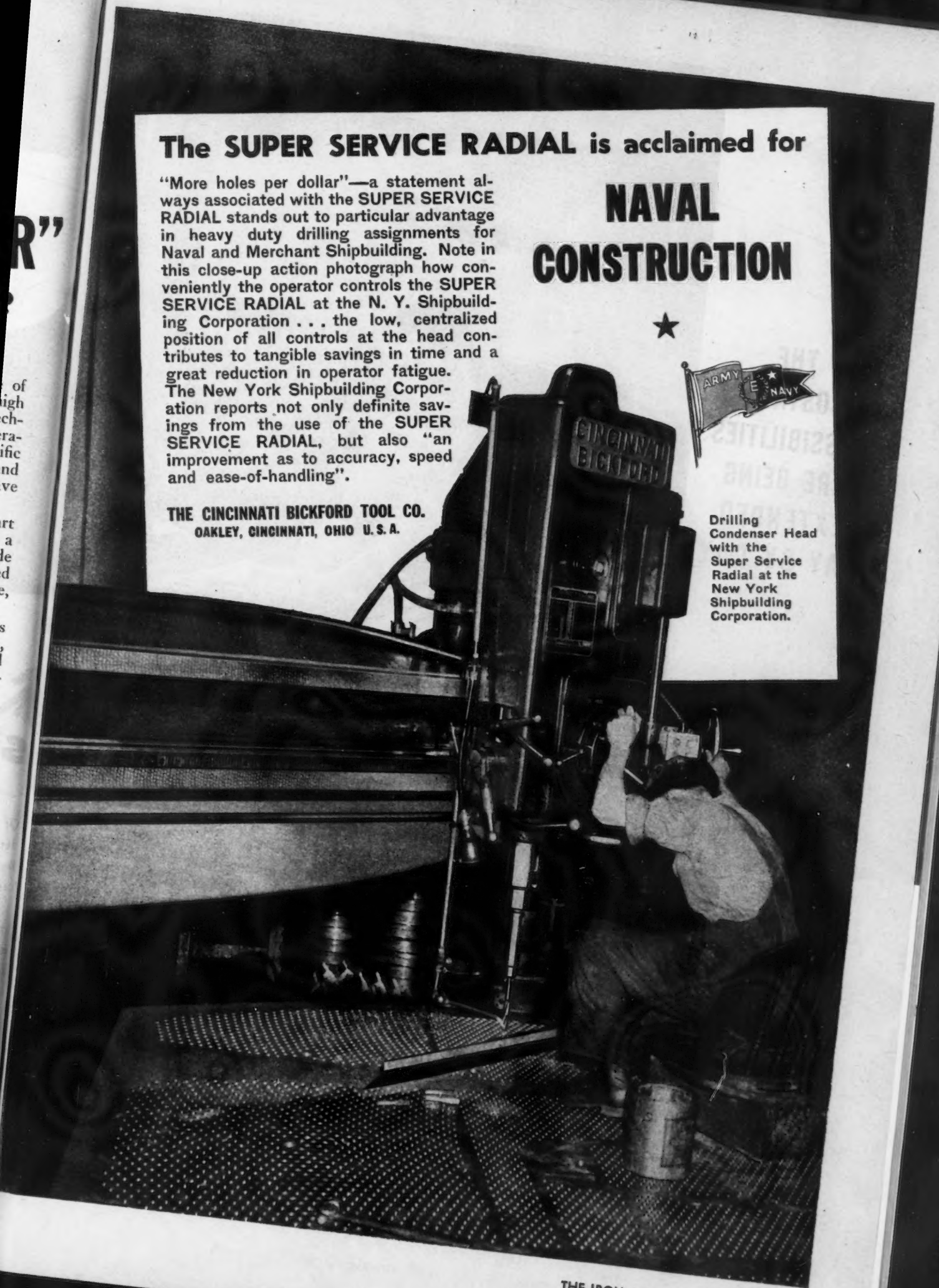
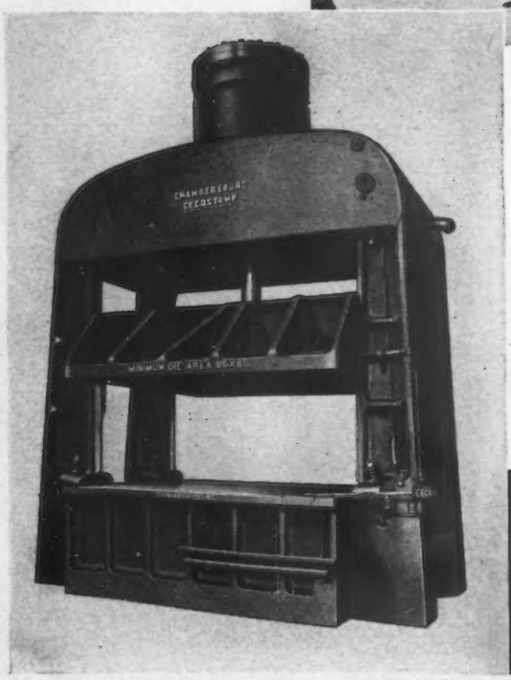
"More holes per dollar"—a statement always associated with the SUPER SERVICE RADIAL stands out to particular advantage in heavy duty drilling assignments for Naval and Merchant Shipbuilding. Note in this close-up action photograph how conveniently the operator controls the SUPER SERVICE RADIAL at the N. Y. Shipbuilding Corporation . . . the low, centralized position of all controls at the head contributes to tangible savings in time and a great reduction in operator fatigue. The New York Shipbuilding Corporation reports not only definite savings from the use of the SUPER SERVICE RADIAL, but also "an improvement as to accuracy, speed and ease-of-handling".

**THE CINCINNATI BICKFORD TOOL CO.**
OAKLEY, CINCINNATI, OHIO U. S. A.




Drilling Condenser Head with the Super Service Radial at the New York Shipbuilding Corporation.

# THE CECOSTAMP'S POSSIBILITIES ARE BEING EXTENDED DAY BY DAY




AIRCRAFT production engineers have been astonished at the number of different sheet metal parts that can be produced on the CECOSTAMP. Its versatility in this respect seems almost limitless. A high production, impact-type stamping machine designed primarily for the aviation industry, the CECOSTAMP is now operating in practically every aircraft factory in this country and in many of our allied countries abroad.

**CHAMBERSBURG ENGINEERING CO., CHAMBERSBURG, PA.**

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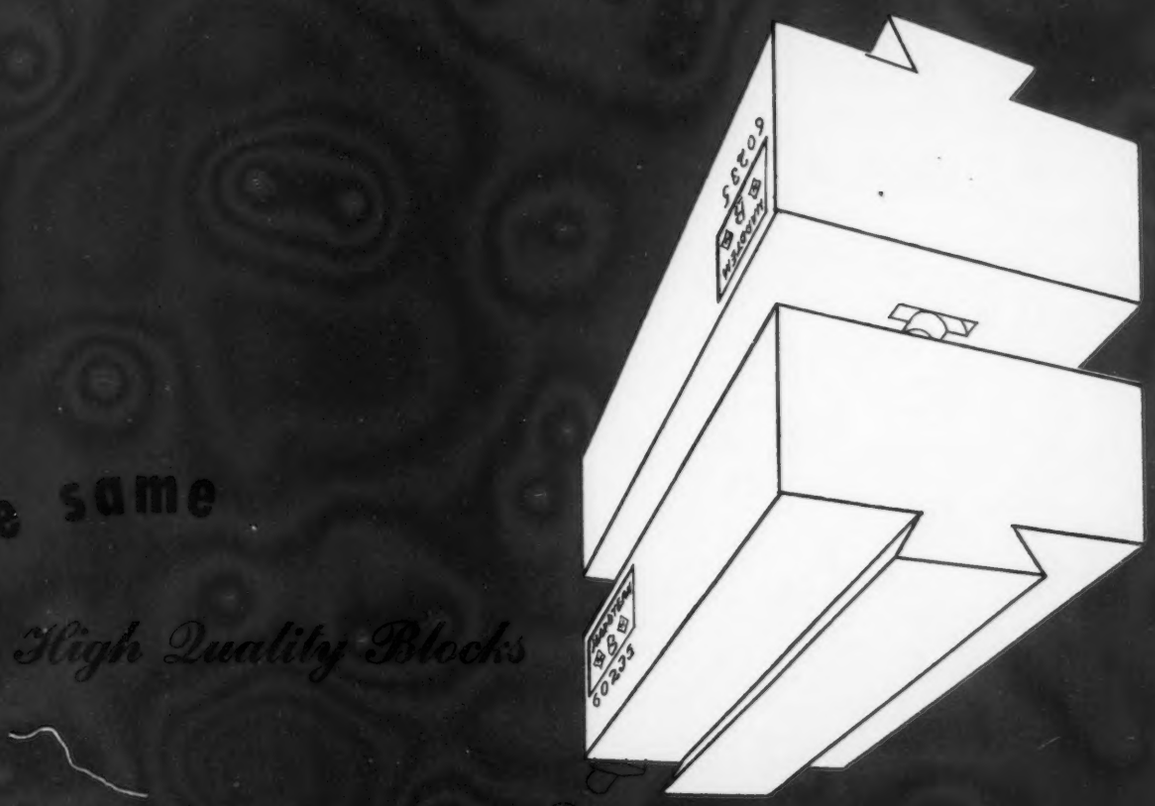

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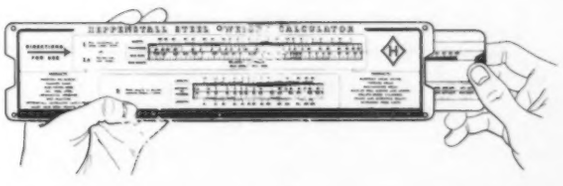

To help speed your war work, Heppenstall offers you this free steel-weight calculator. Write now—the supply is limited.

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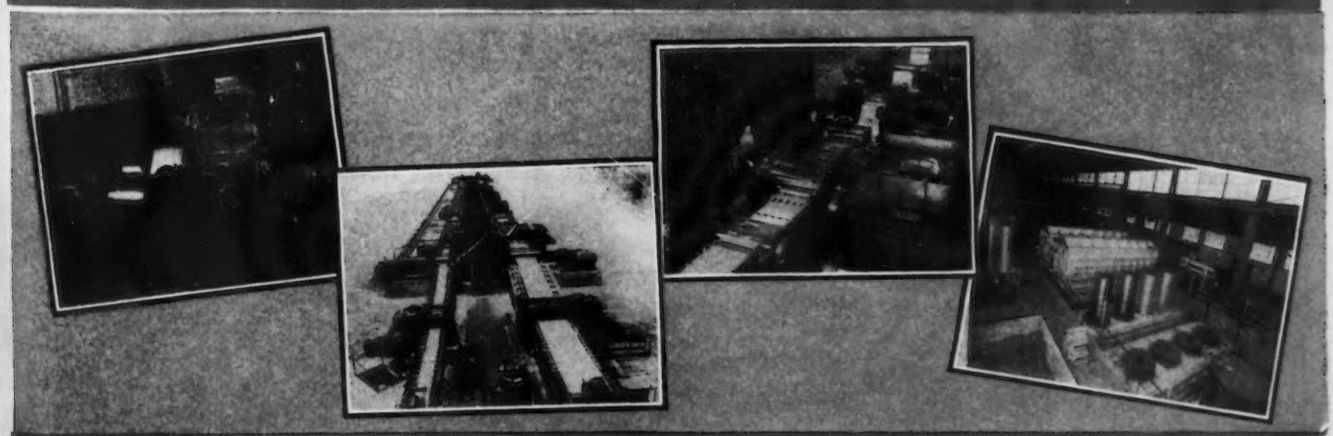

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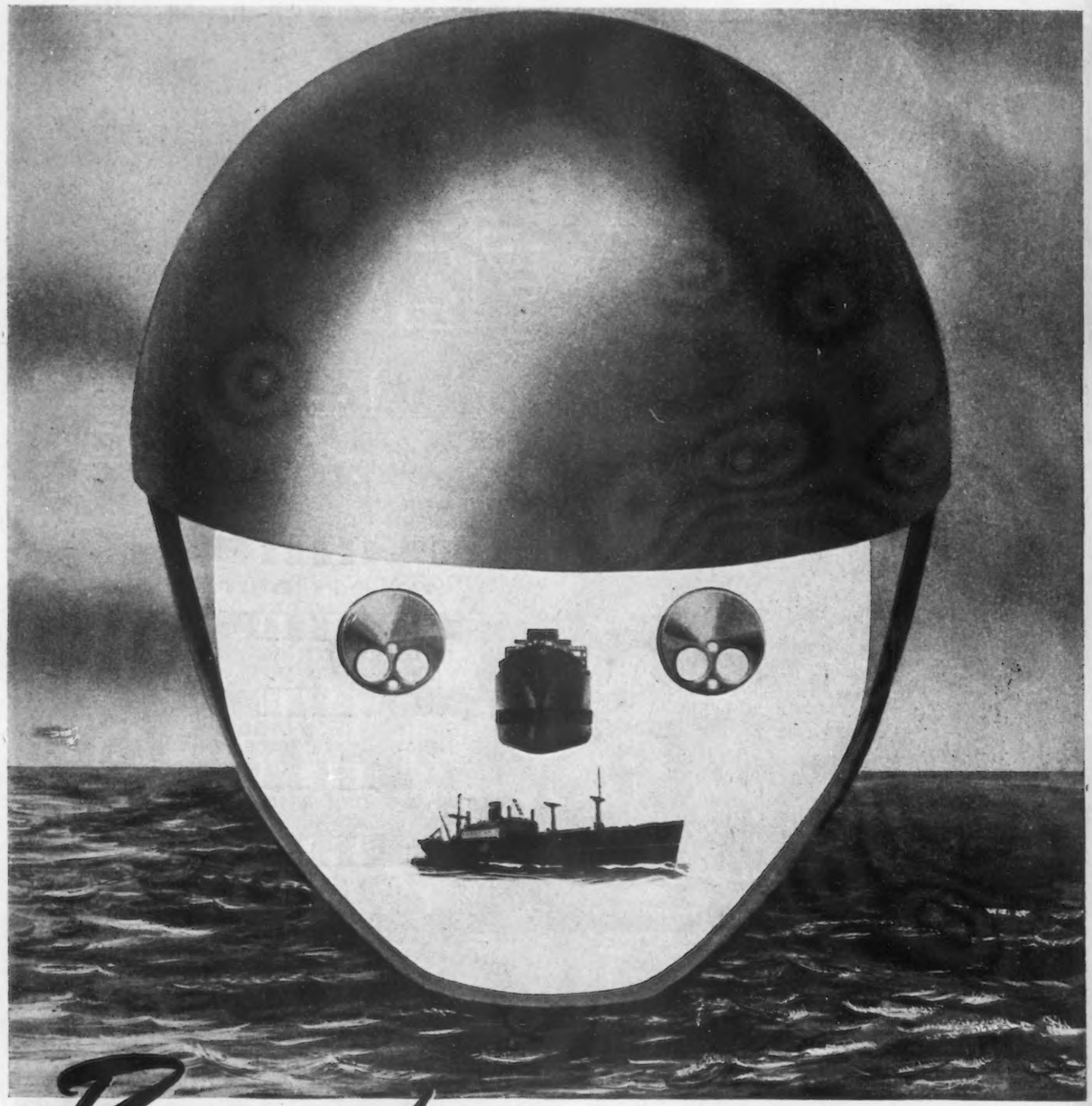

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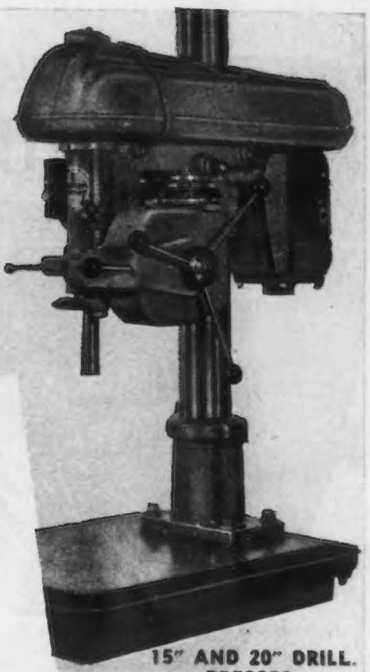

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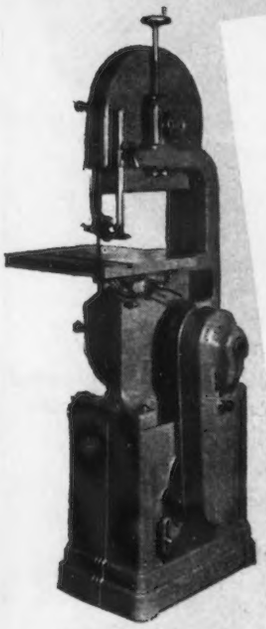

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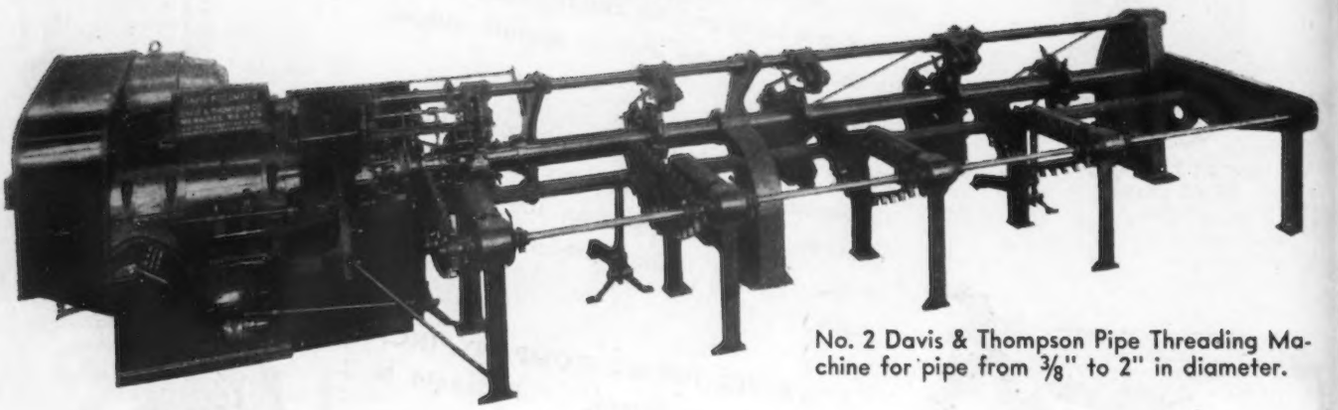
3600 1/2" pipe threaded per hour at an Eastern pipe mill.



No. 2 Davis & Thompson Pipe Threading Machine for pipe from 3/8" to 2" in diameter.

Pipe threading can be handled on a really production basis with the Davis & Thompson Rotomatic Pipe Threading Machines. Two sizes take care of all sizes of pipe from 3/8" to 4". The machines can be single end or double end for threading both ends of the pipe simultaneously.

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We are proud that each of our four plants flies the Army-Navy "E" for Excellence.

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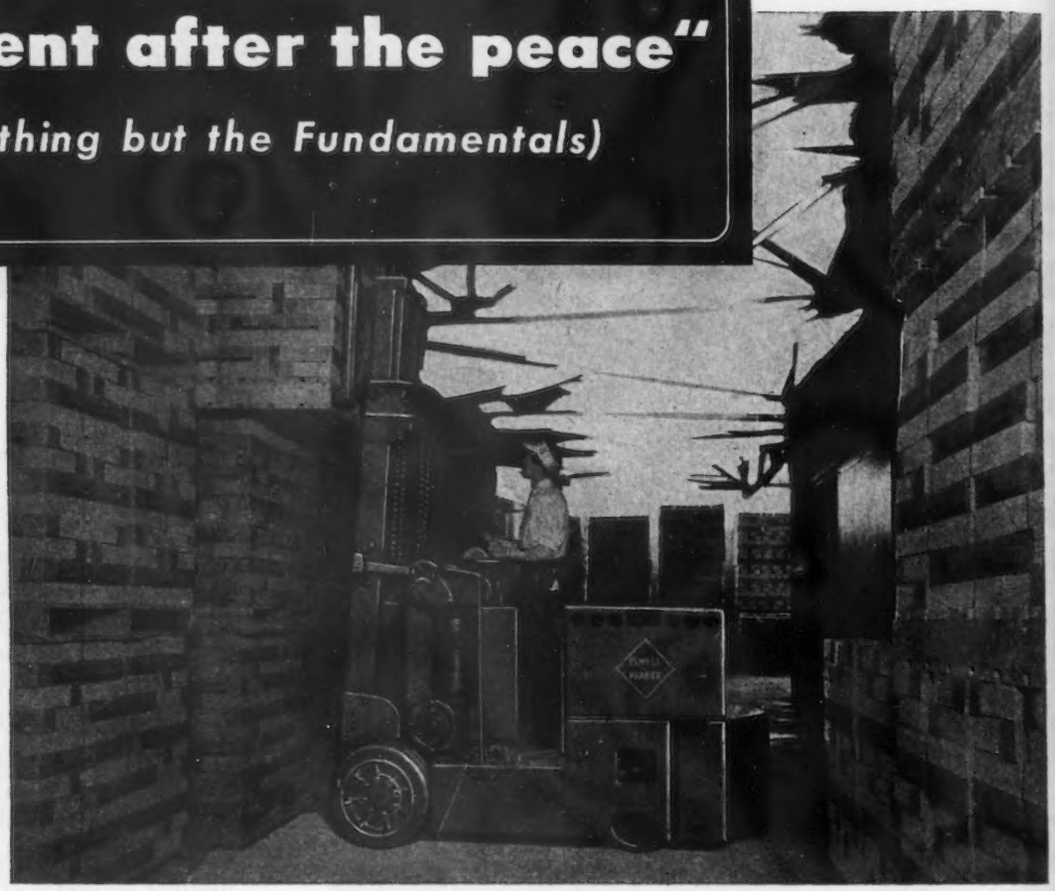
*(Everything but the Fundamentals)*



THE public may find your trademark on the old familiar products—or on things brand-new. Your plants may begin again where Pearl Harbor shut them off—or your Postwar may require radical shop layouts with strange equipment.

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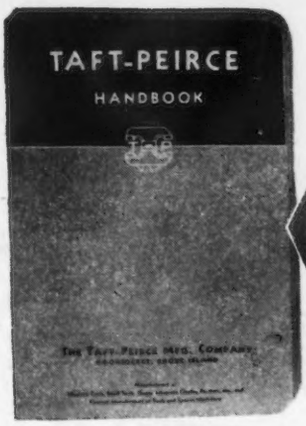


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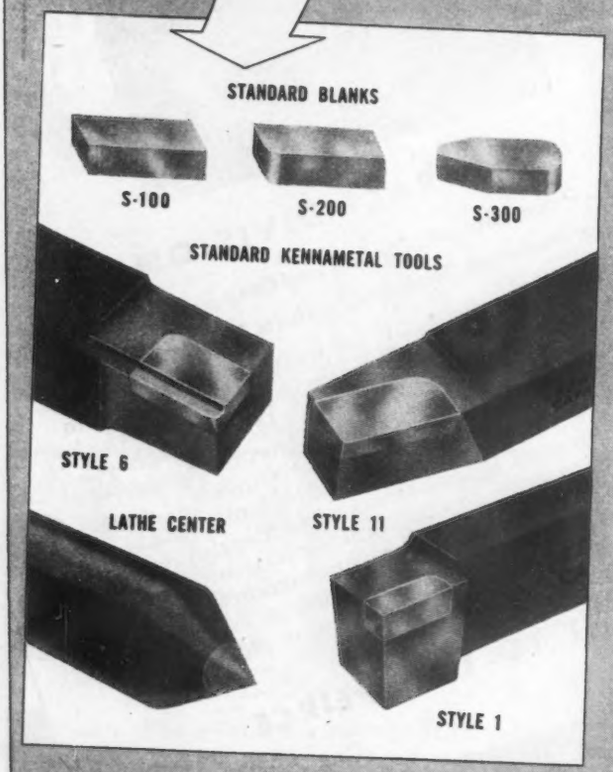


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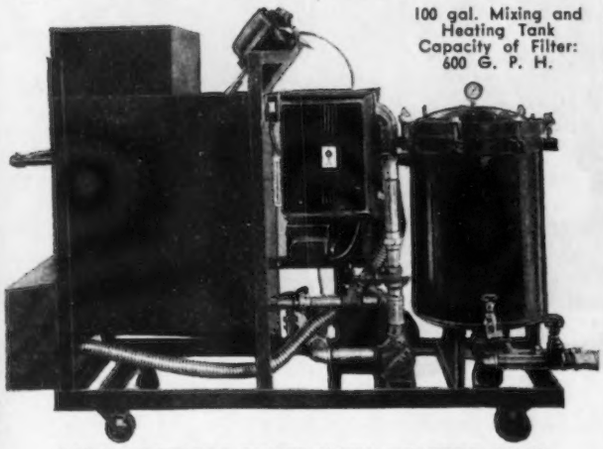


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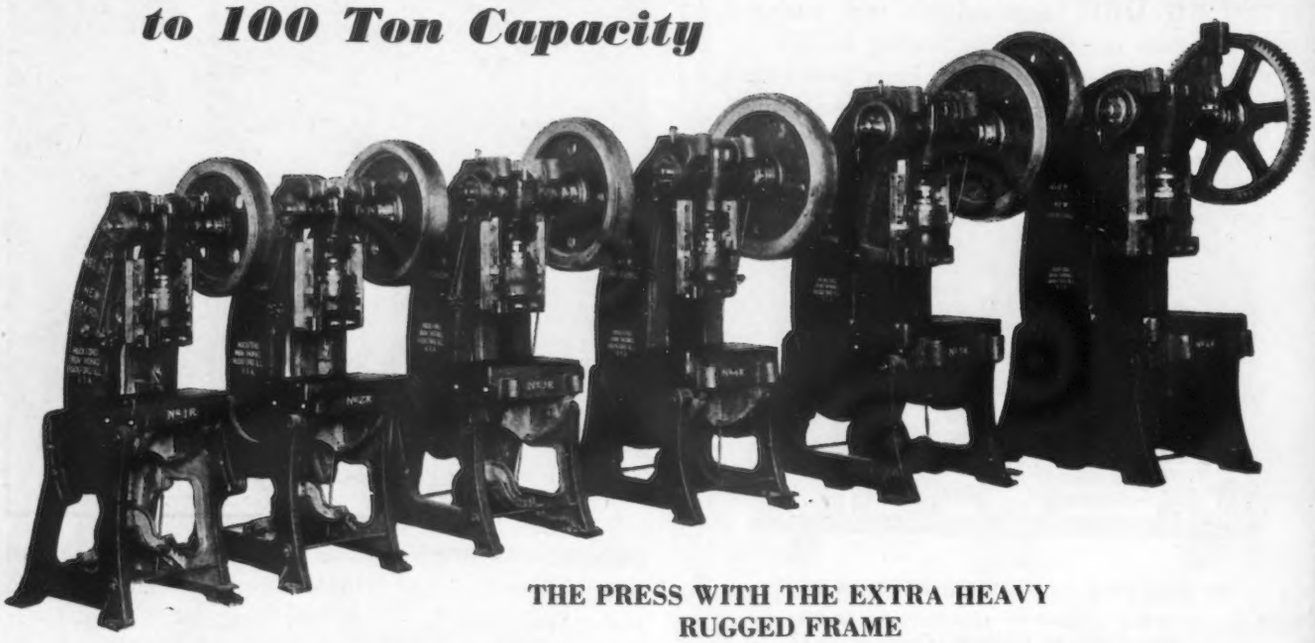

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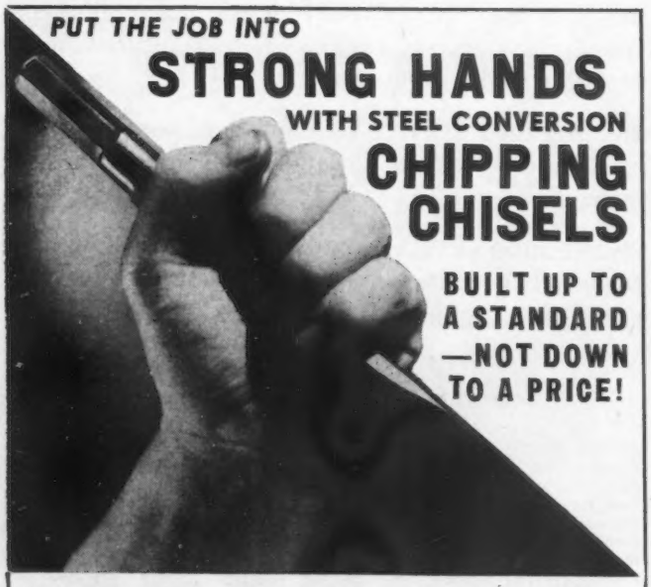

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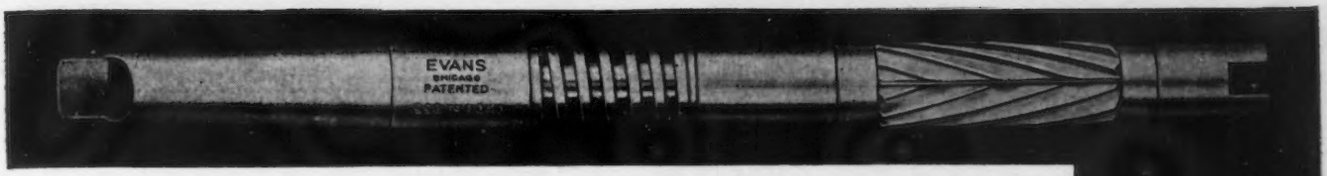


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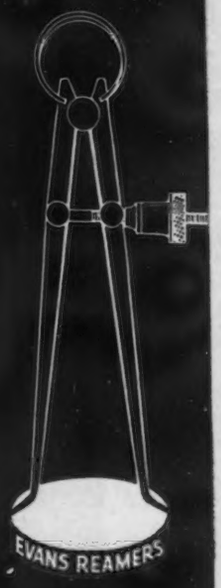


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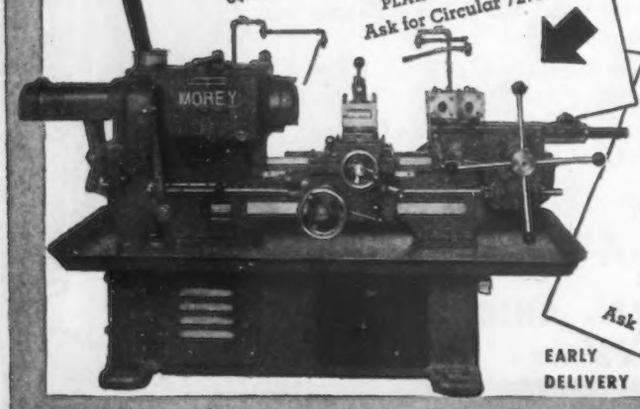


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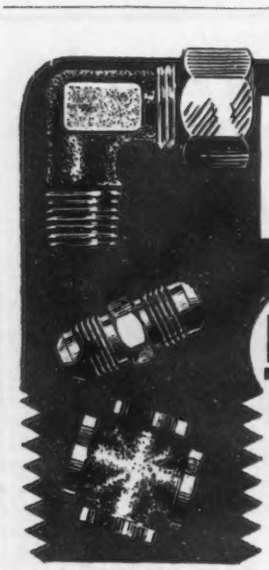

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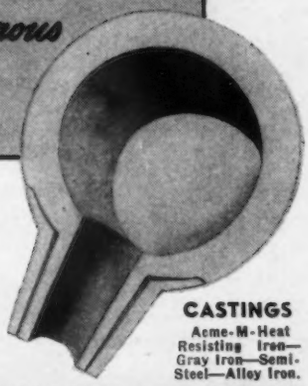

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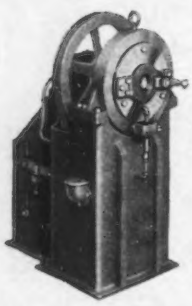

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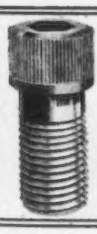
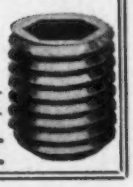


Fig. 1434 Pats. Pend'g

**UNBRAKO**

Fig. 233



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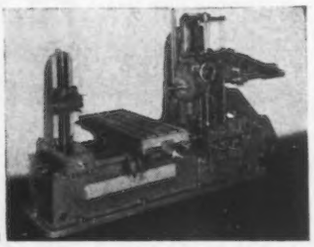

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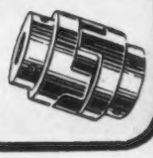

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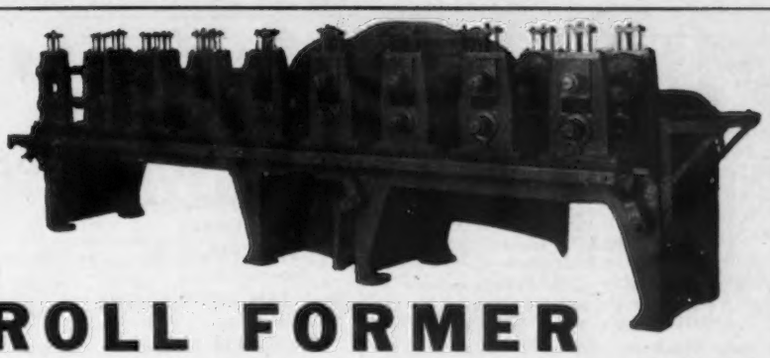

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2¼" Gridley 4 spindle M.D.
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**PRESS, Toggle, No. 3 Bliss, 50 ton**
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*Complete Steam and Electrical Machinery from E. I. Du Pont De Nemours & Company's Carrollville, Wisconsin, Chemical Plant.*

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2—1100 I.-R., 2-Stage Steam Driven Compressors.
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4—Centrifugal Direct Motor Driven Pumps.
6000-4000-600 G.P.M. 1-2-3 Stage.
1—500 Ton Vilter Refrigeration Plant—3 Units.
In Other Boiler Plants:
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Gould 4½x12" Hydraulic Pump—MD.
2500-ton Hydr. Press-upmoving 4 column—Platen 11'8"x16'6" — daylight 9'2"—stroke 66"
50-ton H.P.M.—down moving—2 column bed 24" sq.—daylight 12"—stroke 12"
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Worthington 3¼x18½ steam hydr. pump

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## OVERHEAD ELECTRIC TRAVELING CRANES

| | Tons | Make | Span | Current | Remarks |
|---|---|---|---|---|---|
| (2) | 1 | Euclid | 23'0" | 230-VDC. | Fl. Op. |
| (1) | 1 | Maris | 35'7" | 230-VDC. | Fl. Op. |
| (1) | 3 | Euclid | 30'0" | 220/3/60-cy. | Fl. or Cg. Op. |
| (1) | 5 | Shepard | 30'0" | 230-VDC. | Fl. or Cg. Op. |
| (1) | 7½ | Northern | 28'0" | 220/3/60-cy. | Cg. Op. |
| (1) | 10 | Whiting | 32'0" | 220/3/60-cy. | Cg. Op. |
| (1) | 10 | American | 54'1½" | 230-VDC. | Cg. Op. |
| (1) | 10 | Morgan | 58'6" | 230-VDC. | Cg. Op. |
| (1) | 25 | P & H | 50'0" | A.C. or D.C. | Cg. Op. |
| (1) | 75/25 | Morgan | 59'0" | 230-VDC. | Cg. Op. |
| FOLLOWING (2) CRANES ARE UNDERSLUNG TYPE, SPANS ADJUSTED TO SUIT | | | | | |
| (1) | 3 | Armington | 30'0" | 230-VDC. | Cg. Op. |
| (1) | 3 | Sprague | 29'6" | 230-VDC. | Fl. Op. |

**ELECTRIC TRAVELING GANTRIES**

(1)—50-ton Morgan, 60'0" between legs, 50'0" overhang each end, (2)—25-ton trolleys, 230-VDC., with 3500-ft. of rail & ties.

(1)—5-ton Milwaukee, 3-motors, cage operated, 31'3" span, 13'3" overhang each end. Rebuilt as 220/440-VAC. or 230-VDC.

(1)—10-ton capacity Shaw one leg Gantry, 20' 7½" span, 10'0" overhang one end, 230-VDC.

**SPECIAL: 15-ton McMyler (still erected) 5-ton aux., 80'0" span, 30'0" clear lift, 3-motors, cage operated, now 440/3/25-cycle, will furnish Rebuilt arranged with 220/440/3/60-cycle, or 230-VDC. electrical equipment.**

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(2)—2½ yd. Hayward Electric Buckets.

(1)—1½ yd. Brosius Single Line Bucket.

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(1)—½-ton Shepard Low Headroom Type. 220/-3/60-cy.

(2)—1-ton Euclid, 115/230-VDC.

(4)—1, 2 & 3-ton Shepard, 1 & 2-motors, 230-VDC

(1)—2-ton Box 2-motor, 115-VDC.

(1)—3-ton, 2-motor Sprague, 115/230-VDC.

**230-VDC. CRANE & MILL MOTORS**

| | H.P. | Make | Type | R.P.M. |
|---|---|---|---|---|
| (1) | 1 | P & H | 5½x3½ | 850 |
| (2) | 2 | Shaw | BE | 930 |
| (2) | 2¼ | Westgshe | K-1 | 730 |
| (1) | 2½ | G.E. | CO-2502 | 750 |
| (1) | 2½ | Reliance | T-224 | 1600 |
| (1) | 3½ | G.E. | C.O. 2503 | 975 |
| (4) | 3 | Shaw | BE | 930 |
| (1) | 5½ | G.E. | C.O. 1804 | 725 |
| (1) | 6 | C.W. | M.L. | 930 |
| (1) | 6 | G.E. | C.O. 1805 | 1150 |
| (1) | 10 | G.E. | C.O. 2503 | 850 |
| (1) | 19 | C.W. | B.W. | 650 |
| (1) | 20 | G.E. | C.O. 2504 | 850 |
| (2) | 20/30 | G.E. | M.D.-104 | 725/575 |
| (4) | 25 | G.E. | C.O.-1809 | 550 |
| (3) | 30/45 | G.E. | M.D.-104½ | 625/500 |
| (1) | 65/85 | G.E. | C.O. 1830 | 700/650 |
| (1) | 85 | G.E. | C.O. 1830 | 550 |
| (1) | 150 | Westgshe | MCB-100 | 365 |

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**SPECIAL: (1)—600-HP. G.E. Synchronous motor, 600-RPM, 2300/3/60-cy.**

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*GUARANTEED*
## ELECTRIC POWER EQUIPMENT

**D. C. MOTORS**

| HP | Make | Type | Volts | Speed |
|---|---|---|---|---|
| 1—1500 | Whse. | | 550 | 330 |
| 2—1250 | G.E. | MPC | 500 | 130 |
| 1— 800 | G.E. | MPC | 600 | 600 |
| 2— 625 | G.E. | MPC | 500 | 130 |
| 1— 600 | G.E. | MPC | 600 | 650/900 |
| 1— 600 | Whse | | 250 | 150/275 |
| 1— 350 | G.E. | MPC | 230 | 450 |
| 3— 300 | G.E. | DMC | 230 | 400/600 |
| 1— 300 | Cr. Wh. | CMC | 230 | 1150 |
| 1— 300 | G.E. | MPC | 230 | 275/550 |
| 1— 270 | Whse. | | 500 | 250/400 |
| 1— 250 | Al. Ch. | | 230 | 525 |
| 2— 200 | Whse. | | 230 | 400 |
| 1— 175 | Whse. | SK | 250 | 150/525 |
| 7— 150 | G.E. | RC-19A | 230 | 800/1000 |
| 2— 150 | Whse. | SK-201 | 230 | 300/900 |
| 1— 150 | G.E. | MPC | 230 | 250/450 |
| 2— 125 | G.E. | CO-1832 | 230 | 625 |
| 3— 120 | Whse. | SK-180 | 230 | 720 |
| 3— 100 | G.E. | LC-50 | 230 | 1200 |
| 1— 100 | Al. Ch. | | 230 | 950/1150 |
| 2— 100 | G.E. | RC-19 | 230 | 575/720 |

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**Primary 3 Phase 60 Cycle**

1—1500 KW Whse., 720 R.P.M., D.C. 600 V., A.C. 26400/13200 V.
1—1500 KW Whse., 600 R.P.M., D.C. 600 V., A.C. 11500/10360 V.
1—1250 KW G.E., HHC, 720 R.P.M., D.C. 250 V., A.C. 2300 V.
1—1000 KW Whse., 900 R.P.M., D.C. 600 V., A.C. 11000/2300 V.
2—750 KW Whse., 1200 R.P.M., D.C. 600 V., A.C. 5500/2300 V.
1—750 KW Whse., 720 R.P.M., D.C. 250 V., A.C. 6600/2200 V.
1—500 KW Whse., 900 R.P.M., D.C. 250 V., A.C. 6600/2200 V.
1—500 KW Whse., 1200 R.P.M., D.C. 600 V., A.C. 2300 V.
3—375 KW Whse., 1200 R.P.M., D.C. 250 V., A.C. 6600/2200 V.
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**3 Phase 25 Cycle—Booster Type**

2—1500 KW G.E., HCC, 500 R.P.M., D.C. 225/275 V., 6000 Amp., A.C. 13200/6600 V.
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1, Model 70 Caterpillar Gas Tractor
1, Model 60 Caterpillar Gas Tractor with LeTourneau Bulldozer
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1—36 x 87-in. enameled steel back in two sections.
1—3 x 36-in. kick plate.
Color—Olive green, baked enamel.

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**WANTED**

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manufacturing instruments and articles which are bought by Government and private industries in war and peace time, with prime and subcontracts in hand approximately $200,000.00 equipped with most modern machinery employing approximately 75 men, located midtown Manhattan for sale.

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Located in large City in Minnesota. Good customers; Real opportunity. Must have Fifteen Thousand Dollars. Plant and Equipment, materials and supplies separate. Receivables reserved.

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**TO BUY OR TO RENT**
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**ADDRESS BOX V-902**
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Edging Machine, for rolling wire to lip of tray.
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**PERSONNEL EXECUTIVE**

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Plant is modern, company's policies are progressive and existing industrial relations, with open shop, are very satisfactory.

Years of successful experience in this line of work and the ability to assume responsibility, combined with sound judgment and personality, are requisites for this opening.

Business now operating 100% in war work, but builds nationally known products in normal times.

This is a permanent opportunity for the right man, with advancements according to accomplishments.

Give details as to experience, with whom and for how long, also age and salary expected.

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This is *not* just a temporary war job.

Please in first letter give full particulars as to experience, age, and other appropriate information.

**ADDRESS BOX V-925**
Care *The Iron Age*, 100 E. 42nd St., New York 17

**WANTED**

**MECHANICAL ENGINEER**

Experienced in Sheet Metal fabrication including dies and fixtures. Must be a cooperative individual who can work with both executives and shop men.

This is a permanent position for the right man, but he must be a worker and not a swivel-chair engineer.

Location—Central Ohio.

In reply—state age, background, experience, salary and other necessary information for employment.

**ADDRESS BOX V-919**
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WANTED — INSPECTOR for nickel and chrome iron, heat resisting alloy foundry. Prefer man with some experience on erection and constructions of industrial heat treating furnaces. Address Box C-1105, *The Iron Age*, 1016 Guardian Bldg., Cleveland 14, Ohio.

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**ADDRESS BOX V-931**
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A man who can bring us talent and experience which will fit into our present organization and production facilities and enable us to expand our present and particularly our POST WAR activities.

We will provide such funds as may be required for development work.

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Write in strictest confidence regarding your experience, draft status, and availability. Salary open. Location New England.

**ADDRESS BOX V-929**
Care *The Iron Age*, 100 E. 42nd St., New York 17

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Experienced in estimating erection costs structural steel and general plate work. Must be thoroughly experienced and have first class references. State salary expected. Location in Birmingham, Alabama. Give at least two references.

**ADDRESS BOX V-923**
Care *The Iron Age*, 100 E. 42nd St., New York 17

MECHANICAL DRAFTSMAN with practical mechanical experience in blanking, drawing and forming dies for sheet aluminum products in defense work by old established company in Central West; give experience and full particulars. Address Box V-905, care *The Iron Age*, 100 E. 42nd St., New York 17.

TOOL MAKERS for defense plant in Central West; give experience and full particulars. Address Box V-904, care *The Iron Age*, 100 E. 42nd St., New York 17.

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WANTED: Salesman for Detroit branch sales office of large well known tube manufacturer. Permanent. Should have had previous steel sales experience in Detroit area. Apply, giving full information to Box V-927, care *The Iron Age*, 100 E. 42nd St., New York 17.

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Care *The Iron Age*, 100 E. 42nd St., New York 17

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**BOX C-1101**
*Iron Age*, 1016 Guardian Bldg., Cleveland 14, Ohio

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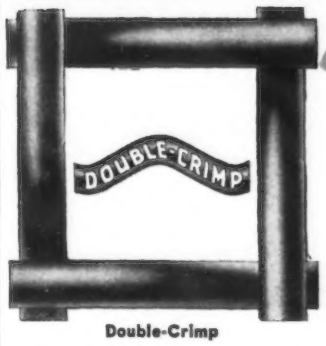


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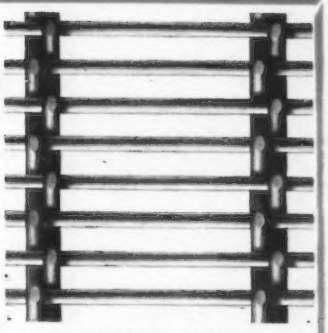
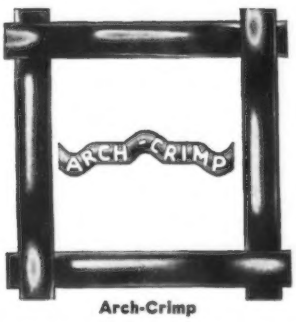
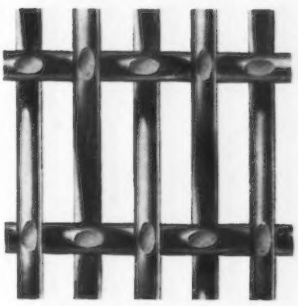


Straight-Warp Rek-Tang

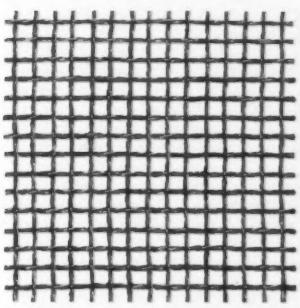



Arch-Crimp



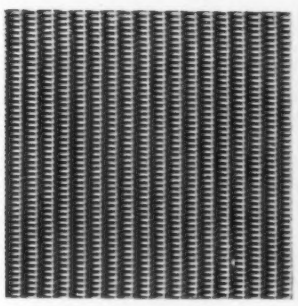
Calendered Rek-Tang

Intermediate-Crimp



Triple Twisted Warp & Fill

Flat-Top



Dutch Weave

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Double-Fill
Dutch
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Rex-Tang
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***Illustrations show items listed in bold-face type. Other wire cloths and screens will be illustrated in subsequent advertisements of this series.***

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ARMY E NAVY

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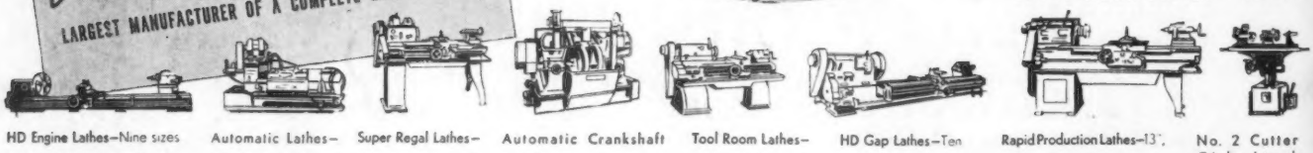

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**Automatic Lathes**—12" & 16" Mechanical or Hydraulic power.

**Super Regal Lathes**—Six sizes, 13" to 24". Best for training.

**Automatic Crankshaft Lathes**—For all facing, turning, finishing, pins.

**Tool Room Lathes**—12", 14", 16" and 18" swings. Versatile.

**HD Gap Lathes**—Ten sizes in Regular and Sliding Gap models.

**Rapid Production Lathes**—13", 17", 20" swings. Six speeds. Faster output. Lower cost.

**No. 2 Cutter Grinder**—Internal, cylindrical, face and angular work.

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FOR ILLUSTRATED SPECIFICATIONS:

- ☐ HEAVY DUTY GEARED HEAD ENGINE LATHES
- ☐ TOOL ROOM LATHES
- ☐ AUTOMATIC LATHES
- ☐ HEAVY DUTY GEARED HEAD GAP LATHES
- ☐ SUPER REGAL GEARED HEAD LATHES
- ☐ RAPID PRODUCTION LATHES
- ☐ AUTOMATIC CRANKSHAFT LATHES
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